

**Values and Attitudes Toward Canada Geese (*Branta canadensis*) and Population
Management on the University of Manitoba Fort Garry Campus**

by

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ABSTRACT

Canada geese populations have increased across North America and have now been declared overabundant in some jurisdictions. Human-geese conflicts may rise, making a case to better understand peoples' views toward this highly adaptable species. This study's goal was to gain a better understanding of a university campus community's values and attitudes as well as acceptance of lethal management techniques toward Canada geese found on the campus. A self-administered online questionnaire, using a modified Tailored Design Method was applied to University of Manitoba students, staff and faculty. Findings showed a significant difference between campus users in both general wildlife and Canada geese value orientations. General wildlife value orientations predicted Canada geese value orientations, while Canada geese value orientations significantly predicted acceptance of lethal population management options. Using the Potential for Conflict Index 2 demonstrated that as the severity of conflict scenarios increased, the level of consensus about lethal management decreased and varied among users. All lethal management options were rejected in favour of public education. This study showed how human dimensions can help management authorities better understand interest groups that may have a relationship with wildlife species. In this case, it also confirmed support for increased public education to minimize human-geese conflicts on campus.

CO-AUTHORSHIP STATEMENT

This thesis is the original work of the primary researcher of this study, including the literature review, research proposal and design, applied aspects of the research project, data collection and analysis and finally, the manuscript preparation and conclusion. Committee members contributed through critical reviews and feedback incorporated into the final research results.

DEDICATION

To little girls who look under rocks

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CHAPTER 1. Introduction

1.1 Problem Statement

Manitoba has an overabundant Canada goose, *Branta canadensis*, population (Government of Manitoba, 2024) which can lead to conflicts with humans. In April of 2017, the University of Manitoba's Fort Garry campus received several complaints in response to an egg culling event where staff cracked eggs in the nest as part of a permitted program to reduce the Canada goose population (Counter, 2017). The following days saw complaints, an online petition that pressured the University to cease all lethal forms of population control (Leboe-McGowan, 2017) and negative publicity (CBC, 2017). The University of Manitoba has since adopted a public education approach to prevent human-wildlife conflicts on campus. Though education is an accepted response to human-wildlife conflicts, education alone may not be sufficient to eliminate conflicts (Baruch et al., 2011; Espinosa & Jacobson, 2012).

This thesis presents the research findings of a study that gained a better understanding of the campus community's acceptance of different management techniques, in particular lethal approaches toward Canada geese found on the campus of University of Manitoba. In addition, this thesis explores the level of consensus between different groups thus providing decision-makers with improved knowledge when considering human-wildlife issues. These topics, discussed more below and described in more detail in the following chapters, provide a more fulsome view of campus users' values and attitudes toward wildlife, Canada geese and their management for the University of Manitoba's administration to consider.

1.2 Human Dimensions of Canada Geese

Humans' relationship with Canada geese, in Manitoba has a long and complex history. Historically and to present day, many Indigenous peoples and licenced hunters anticipate the goose hunt for a source of fresh nutrients. Nearly the entire goose can be consumed- intestines, liver, lungs, gizzards and meat each offering substantial levels of protein, iron and zinc (Belinsky & Kunhnlein, 2000). The rapid settlement and conversion of parklands to agricultural fields in the late 19th century and into the mid-20th century however, had a dramatic effect on the goose populations that had established in Manitoba's prairies. Early unregulated hunting, egg collecting, and continued egg poaching into the 1970s (Cooper, 1978) resulted in a remarkable population decline and eventual extirpation in many parts of their historic range. Protection has since contributed to rapid population recovery from near extinction in pre-1950s (Conover, & Chasko, 1985; Messmer et al., 1997; Mississippi Flyway Council, 2017).

The current North American Canada goose population estimate is at least 7 million (Government of Canada, 2019) which can support robust domestic and cross-border hunting opportunities. An economic study in Saskatchewan found that between 1991 and 2001, American hunter interest focused primarily on migratory waterfowl grew "significantly" (Government of Saskatchewan, 2002). The same report found that 71% of non-resident hunters pursued waterfowl birds, because no outfitter guide is required, as opposed to big game hunting.

In Manitoba, mentored hunts focusing on Canada geese are often an introduction for new hunters wishing to develop the skill. In September 2017, 18 mentored waterfowl/ game bird hunts were delivered through the Manitoba Mentored Hunt Partnership (Government of Manitoba, 2018). In 2019, the estimated number of hunters (big game, waterfowl, game bird combined) was 49,339 in Manitoba which contributed between \$212 and \$238 million to the

economy through total expenditures (gas, travel, travel services, accommodations etc.) (Government of Manitoba, 2019; Conference Board of Canada, 2019).

Canada geese are a common sight in many urban parks, suburban neighbourhoods and open fields in Winnipeg. Residents can often be observed interacting with Canada geese by feeding them, taking photographs or simply watching them. Fort Whyte Alive, located less than 10 kilometers from the University of Manitoba (U of M) Fort Garry campus, is an environmental education center that provides wildlife viewing experiences in a naturalized setting. Each spring, resident Canada geese return to their nesting grounds, lay eggs and rear their young in the relative safety of the urban preserve and its artificial lakes.

Fort Whyte Alive, a semi-urban environmental education center, also hosts annual fall migration viewing events where visitors can take part in special viewing opportunities such as an outdoor dinner at dusk when geese fly only a few feet above as they descend into one of the lakes for the evening. In 2016, the center earned \$2,529,300 in total revenue comprised of donations, fundraising, program fees and other revenue sources (Fort Whyte Alive, 2020) demonstrating that non-consumptive uses are also economically beneficial. The ease of access to this facility, and perhaps the balance of naturalized and familiar urban design, makes it a favourite location for visitors and residents alike to photograph, admire, observe and otherwise enjoy Canada geese.

1.3 Canada goose Management and Regulatory Framework

In North America, Canada geese are managed cooperatively across their migratory range between the Canadian Wildlife Service and the U.S. Fish and Wildlife Service. This international

management approach is divided into four distinct flyways, that delineate geographic migratory route boundaries: the Pacific Flyway, the Central Flyway, the Mississippi Flyway and finally, the Atlantic Flyway (Figure 1). The Mississippi Flyway sees approximately 1,501,000 geese based on monitoring surveys (U.S. Fish and Wildlife Service, 2019). Winnipeg is located within this flyway.

The *Migratory Birds Convention Act, 1994* provides the legal protection and management authority for Canada geese and other migratory game bird species under federal law (Government of Canada, 2020). This protection, in part, has contributed to the rapid population recovery from critically low population estimates in pre-1950s (Mississippi Flyway Council, 2017).

The City of Winnipeg approaches Canada goose management through the Urban Goose Working Group. This collaborative approach between the Government of Canada, the Province of Manitoba, the Winnipeg Airport Authority, and the City of Winnipeg works to “reduce risks to human health and safety caused by Canada geese in the City of Winnipeg” (City of Winnipeg, 2022).

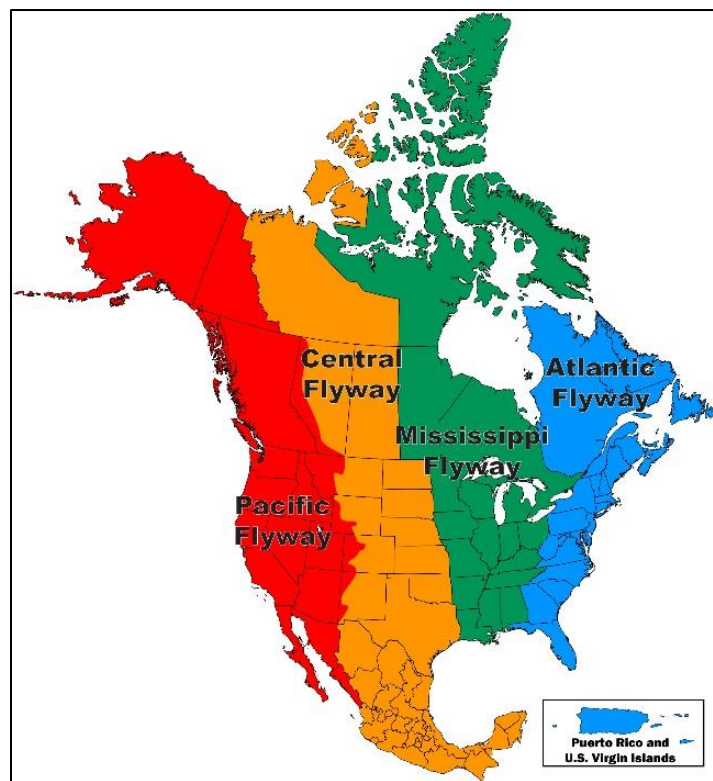


Figure 1.1 Map of North American boundaries for cross-border migratory bird management. U.S Fish and Wildlife Service, 2023

One major management approach the working group has undertaken has been egg removal along Kenaston Boulevard, a busy traffic route. According to the group’s webpage, egg removals have

reduced goose strikes resulting in fewer traffic accidents by reducing the number of animals that feed on the shoulder of the street. The number of hazards has also been reduced on the high-speed road as fewer geese attempt to cross, further reducing traffic accidents and animal fatalities. The working group also partners to implement spring and fall population surveys of resident and migratory geese in and around Winnipeg.

The University of Manitoba has also assembled a group to address geese on the Fort Garry campus. The Goose Education and Awareness Committee includes campus interest groups, the Province of Manitoba, and Environment Canada. This committee is “dedicated to providing tools and resources to the University community about our native goose population” (University of Manitoba, 2019). In 2018, a consultant developed a wildlife management plan that includes goose management at the U of M’s request (University of Manitoba, 2019). This plan was completed in February 2020 (University of Manitoba, 2020²), though it is not currently available for public review. To date, the Committee has developed a section on the U of M’s website that provides information about Canada geese, an interactive nesting site map, a portal to report injured or aggressive geese and nesting sites. A section containing articles about geese on campus as well as a link to a page for a broader wildlife management plan is also on the Committee’s website: https://umanitoba.ca/campus/physical_plant/wildlife_plan_overview.html.

Finally, the University’s Sustainability Strategy 2019-2023 provides general performance measures aimed at sustainable wildlife management on campus, including increasing the % of completed recommendations in the Wildlife Management plan as a priority for the Office of Sustainability and Operations and Management (University of Manitoba, 2024).

1.4 Canada geese Characteristics and Distribution

Throughout their ranges, Canada geese are divided into two populations- resident and migratory. Resident geese return to the same location each spring to nest, moult and raise young. Migratory geese on the other hand arrive to an area in the fall as part of their annual migration. They will stage for a few days to weeks to feed and then continue their route to their nesting grounds.

The Canada geese observed in Winnipeg and surrounding areas in the spring and summer are usually giant Canada geese (*Branta canadensis maxima*) though other species such as the Lesser Canada goose (*Branta canadensis parvipes*) or the recently identified Cackling goose (*Branta hutchinsii*) may also be observed during early or late migratory windows (Smith et al. 2000). Though these goose species are all very similar in appearance, giant Canada geese are the largest, with long necks distinguished by white cheek patches against black or near black heads, necks and buff brown body with black legs and feet (Johnsgard, 2010; Ducks Unlimited, 2020).

Prime nesting locations are within 150 ft of water, on flat ground in wide open spaces. Urban Canada geese are very adaptable to infrastructure and may nest close to trees or on buildings (Allen et al., 1995). Proximity to water on flat ground allows geese to forage for aquatic food, drink, preen and bathe only a short distance from their nest site and provides an escape route from predators which can easily be seen from afar (Smith et al., 2000). Urban Canada geese are also more tolerant of higher nesting densities than sub-urban geese and may build nests within 6 to 10 feet of another breeding pair (Allen et al., 1995). Once a suitable nesting site is established, female geese will usually return to that same site year after year.

Canada geese lay an average of 5 eggs per nest (Cotter et al., 2013), though the actual number can range between 1 and 15) (Smith et al., 2000). Urban nesting Canada geese have shown gosling survival rates up to 77% (Johnson & Sibly, 1993), compared to rural nesting geese averaging 59%. Juvenile geese will fledge into adult plumage within four months of hatching (Smith et al., 2000).

1.5 Canada geese and Human Conflicts

Despite the positive interactions between humans and Canada geese previously described, overabundant wildlife populations can quickly lead to conflicts with humans. Canada geese are highly adaptable and can thrive in urban settings. According to one study, when the number of geese exceeds 40-60 at a single location, there is a strong likelihood human wildlife conflicts will occur (Conover & Chasko, 1985).

Some of the major conflicts arise due to the distribution of goose droppings in areas shared by humans and their companion animals used for recreation, travel, or other outdoor activities. In one study, the cost of cleaning goose droppings from sidewalks was estimated at \$60 or more per bird (Allen et al., 1995). Goose droppings can damage landscaped areas due to high nitrogen concentrations that can overfertilize areas (Bruinderink, 1989), leading to turf grass die off and costly reseeding. Geese can also damage grass when repeated or extended use of an area results in the grass getting trampled, dies and exposes the bare soil. This transformed soil is referred to as “hard pan” and prevents natural revegetation, resulting in bare patches (Conover & Kania, 1991). The cost of maintaining areas where geese and humans exist can also create its own conflict by challenging the willingness to pay for such maintenance and who bears the cost.

While both the male and female geese will guard a nest site, once a clutch of eggs is established, only the male will defend the area. Defensive behaviours include a range of actions from simply standing up, honking, hissing (Clermont et al., 2019) to charging, driving off predators to even driving the incubating female off the nest and guarding the nest itself (Kossack, 1950). These behaviours are directed toward other geese, predators and even humans, if the goose feels threatened. This territorial behaviour may also limit other avian species from nesting in areas with high Canada goose populations (Mississippi Flyway Council, 2017).

1.6 Human Dimensions of Wildlife Management

Human dimensions of wildlife management (HDWM) is an emerging area of research rooted in social science and cognitions. *Cognition* refers to the “mental processes and activities used in perceiving, remembering, thinking, and understanding” (Ashcroft, 1994) and how these processes are applied to navigate different scenarios through life. The focus of HDWM is to predict and understand peoples’ thoughts and actions about and toward wildlife then apply this knowledge toward management and policy decisions (Manfredo et al. 1996; Decker & Chase, 1997). HDWM can also determine if the public’s attitudes, beliefs and/ or knowledge about wildlife topics are changing (Bath, 1998).

Views toward wildlife *have* changed over the past decades. One theory for this change is a Materialist/ Post-Materialist value shift following World War II (Inglehart, 1990). As societies emerged from a period of industrialization focused on economic growth, the public’s values also evolved beyond simply fulfilling food, shelter, and security requirements (material needs). As economic security stabilized, more interest and importance were placed on less tangible

requirements such as quality of life, the environment and self-expression (post-materialistic needs) (Inglehart & Baker, 2000). This new interest in improving ones' quality of life while developing a changing view of the environment signaled a major value shift in society.

Early work by Kellert (1985) focused on distinguishing values toward wildlife, resulting in nine fundamental values toward wildlife that describe people's primary interest regarding wildlife: 1) utilitarian- the practical and material value of animals; 2) naturalistic- affection for wildlife and the outdoors; 3) ecologicistic-recognizing the interrelatedness between wildlife and habitats; 4) scientific- aimed at understanding biology and physiology of wildlife; 5) aesthetic-artistic and symbolic characteristics of wildlife; 6) symbolic- humanistic- affection toward specific animals, mainly pets;7) moralistic- ethical treatment of animals; 8) dominionistic- asserting control over animals, often in a sport/ entertainment context; 9) negativistic- the avoidance of animals, often stemming from fear.

In this context, *values* are understood to be “basic social cognitions... that transcend situations and issues” (Rokeach, 1973) that are typically shared by members of a community or group (Fulton et al., 1996). Surprisingly though, the same study identified divergent attitudes even *within* groups. Here, *attitudes* are defined as “an evaluation either favourable or unfavourable, of an entity (e.g., person, object, or action) and are useful at predicting behaviours (Vaske, 2019). For instance, while some hunters whose primary interest in wildlife was a food source (utilitarian attitude), other hunters prioritized experiencing the outdoors, which ranked equally as high with environmental protection organizations (naturalistic attitude). The identification of these broad attitude categories provided key insight into how groups of people with similar perspectives may think collectively about wildlife, but also exposed the complexities that can exist within.

Building on Kellert’s work, the development of general *wildlife value orientations* (WVO)s was further articulated and defined in Fulton et al (1996) as “patterns of direction and intensity among a set of basic beliefs regarding wildlife” that can influence our attitudes (Vaske, 2019). Fulton et al. expanded on Kellert’s earlier work to identify basic belief dimensions related to wildlife that proved the predictive quality of value orientations on attitudes (Table 1.1). From this work, two initial wildlife value orientations emerged: a wildlife benefits/ existence value orientation and, a wildlife rights/ use value orientation. Over the next decade, this original framework was further examined and tested, ultimately resulting in two simplified WVOs that are more broadly applied today: domination and mutualism (Jacobs et al., 2014).

Table 1.1 Wildlife belief dimensions developed by Fulton et. al (1996).

| Preliminary Wildlife Belief Dimensions | |
|---|--|
| 1) wildlife use- beliefs about using wildlife for human benefit | 5) hunting/ anti-hunting- beliefs about the humaneness of hunting and if it is a positive activity |
| 2) wildlife rights- beliefs about wildlife rights | 6) residential wildlife experience- beliefs about wildlife in one’s neighbourhood and near one’s residence |
| 3) recreational wildlife experience- beliefs about wildlife in a recreational context | 7) wildlife education- beliefs about learning and teaching others about wildlife |
| 4) bequest & existence- beliefs about healthy wildlife populations and ensuring they exist for future generations | |

| | |
|--|--|
| | 8) fishing/ anti-fishing- beliefs about the humaneness of fishing and if it is a positive activity |
|--|--|

Domination WVOs encompass utilitarian wildlife uses and hunting belief dimensions, supporting the use of wildlife for humans’ benefit. Individuals who align with this WVO are more likely to justify killing or harming wildlife in defense of human well-being. Mutualism WVOs in contrast, comprise wildlife care and rights dimensions, that contribute to wildlife being considered on more egalitarian level with humans. People who hold this WVO may view wildlife as a family member (albeit extended) and are more likely to support actions to improve the welfare or quality of life over harming or killing wildlife (Jacobs et al., 2014). Within these two general value orientations, four distinct subtypes can exist- utilitarian, mutualist, distanced and pluralist (Teel et al., 2005). These are discussed in greater detail in Chapter 2.

The cognitive hierarchy model (Fulton et al., 1996) illustrates the associations between values, attitudes, value orientations and how these inform beliefs, behavioural intentions and ultimately, behaviours themselves. This model provides the conceptual framework to study the relationships between values and attitudes, factors that may influence cognitions and acceptability of management actions of the staff, faculty, and students of the U of M. The following chapters will provide a more in-depth discussion of this framework.

1.7 Research Objectives

The primary purpose of this thesis is to offer insight into the relationship three main campus user groups (faculty, students and staff) have toward Canada geese on the University of Manitoba campus. This research is guided by two main objectives:

1) Identify faculty, staff and student values and attitudes about Canada geese on campus.

This objective will first be achieved by identifying general Wildlife Value Orientations (WVO) held by faculty, students and staff, followed by Canada goose specific value orientations. Finally, the data will be analyzed to determine if general WVOs can predict value orientations specific to Canada geese. Though WVOs are commonly used to predict attitudes and behaviours, there are only a few examples of using general WVOs to predict value orientations for a specific species.

2) Identify and document acceptance of lethal population management techniques in human-goose interaction scenarios on U of M campus.

This objective will use value orientations for Canada geese to predict acceptability of population management techniques ranging from non-lethal to lethal in a variety of human-goose encounters. Next, the level of conflicting attitudes toward lethal management options will be investigated as well as the presence or absence of consensus among campus user groups using the Potential for Conflict Index 2 (Vaske, 2018), described in greater detail in Chapter 3.

1.8 Study Area

This study will focus specifically on the University of Manitoba, Fort Garry campus located in the south end of Winnipeg, Manitoba, Canada.



Figure 1.2 Map of southern Manitoba showing Winnipeg identified with star in bottom right section. GIS Geography

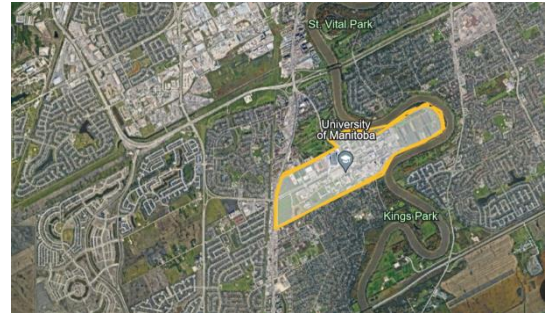


Figure 1.3 Study area highlighted in yellow showing approximate outline of the University of Manitoba

The campus is adjacent to two residential neighbourhoods: Fort Richmond, an established suburb to the south, and a major infill project currently underway, Southwood Circle to the north, a portion of which is a former golf course. The westerly border of the campus is defined by Pembina highway which is a major traffic route in the city while the Red River defines the eastern border of the property. A large portion of the campus is located along a bow of the Red River, including a walking trail in the adjacent greenspace. This location and relative isolation from the rest of the city provides a naturalized habitat for a variety of wildlife species including fox, white-tailed deer, raccoons, owls, songbirds, and others. The total student enrollment for the

fall term in 2021 was 31,037 with a complement of 5252 academic staff and 3838 support staff (University of Manitoba, 2022).

The campus spans over 691 acres with major landscape features including experimental agricultural fields, retention ponds, courtyards, and walking paths. Infrastructure consists of approximately 60 buildings that house academic spaces, living accommodations, recreational facilities, libraries, and support/ administrative offices and a variety of parking lots throughout the campus. There is also an outdoor, multipurpose stadium as well as a professional football stadium, home to the Winnipeg Blue Bombers of the Canadian Football League (University of Manitoba, 2022²).

This study area was selected due to past conflicts over Canada goose management approaches on campus and because of the opportunity to study a unique community of users and wildlife within an established geographic location. The outcomes of this study may also inform urban planning decisions as the university is in the early stages of a campus expansion.

1.9 Outline of Chapters

Chapters 2 and 3 are organized in manuscript format and in accordance with the objectives of this study, which are to understand campus users' values and attitudes toward Canada geese and population management on the University of Manitoba campus. The first research objective investigated the differences in general wildlife and Canada goose specific value orientations between campus users and if general wildlife value orientations could predict species-specific orientations among campus users. The second research objective identified and documented acceptance of lethal population management techniques in human-goose interaction

scenarios on the University of Manitoba campus. Summaries of chapters 2 and 3 are provided below.

Chapter 2 comprises a manuscript entitled “Understanding Campus Users’ Values and Attitudes about Canada Geese”. First, differences in general wildlife value orientations of each campus user group were explored as well as differences in Canada goose specific value orientations. Using these same two factors, the ability to predict Canada goose specific value orientations using the general wildlife value orientations was investigated. Data were gathered from 2479 self-administered online questionnaires, distributed using the University of Manitoba’s listserv email accounts. General domination and mutualism wildlife value orientations differed between groups ($p=0.017$ and $p<0.001$ respectively) with a significant difference between students and staff ($p= 0.012$ and $p=0.001$). Canada goose domination value orientation found no significant difference between groups, though, the mutualism value orientations did significantly differ between campus users ($p= <0.001$). A significant difference was identified between students and staff, with staff being statistically more mutualistic than students. Regression analysis using the general wildlife value orientation (independent) and the Canada goose value orientation (dependent) variables predicted 68% of the variance between these two. The dominism and mutualism variables for each factor was also examined and determined that the dominism variable (65%) was a better predictor than mutualism in this case.

Chapter 3, is comprised of a manuscript, named “Acceptance of Lethal Population Management Techniques in Human-Goose Interaction Scenarios on the University of Manitoba Campus”. In this chapter, the use of Canada goose value orientations was used to predict the acceptance of lethal management in different human-goose encounters. The Potential for Conflict Index² (PCI²) was used to identify the amount of consensus among campus users as

management options became more extreme, and to determine if consensus between groups would vary. Data were obtained from a self-administered questionnaire (n= 2479) distributed via email to campus users. Three scenarios were considered: 1) a pair of geese hiss at humans, 2) a pair of geese charge at humans, and 3) a pair of geese attack humans. In each of these scenarios, the general wildlife value orientations and Canada goose specific value orientations were compared to predict the acceptability of removing (killing) the pair or the entire family. The Canada goose value orientation significantly predicted the acceptance of lethal management options. The PCI2 demonstrated there was less consensus among groups as lethal management options became more extreme ranging from 85% disagreeing with killing geese in scenarios 1 and 2, while only 80% disagreed in the third scenario. Consensus for lethal population management varied between groups. Students and faculty significantly differed on removing (killing) a nesting pair when geese hiss at people, and when geese charge people. When geese attack humans, there was a significant difference between staff and students regarding removing (killing) the entire family.

1.10 Data Collection

A draft questionnaire was developed using previously validated questions to determine general wildlife values (Fulton et al., 1996; Manfredo et al., 2004) and questions adapted from Engel et al. (2017). A draft questionnaire was administered to a small pilot group to ensure the online method was accessible, to adjust any vocabulary, confirm the expected length of time to complete and to ensure data could be exported from the online survey platform. Based on initial feedback from the pilot sample, some questions were re-worded slightly for clarity. An Exploratory Factor Analysis (EFA) was then performed on the data to confirm expected

relationships between variables and to ensure the items were measuring the intended concepts. This was followed by a reliability analysis. The EFA and Chronbach's Alpha Reliability Estimate confirmed the items were effective at measuring the intended concepts, thus, no questions were re-worded further.

The pilot and data collection periods took place during the Covid-19 lock downs where the campus was not accessible by most users, and thus omitted in-person survey methods. A census method was adopted as access to the full campus population was available using the university's Listserv and because of the ease of gathering data through an electronic format. To distribute the study questionnaire, U of M campus users were contacted using the Listserv through the Vice Provost Office with an introductory email explaining the study and its relevance to Canada goose management on the Fort Garry campus. Campus staff, students and Faculty members >18 years old were invited to participate. Participants were given the option to proceed and could withdraw at any time or skip any questions they did not want to answer. Two follow-up/ reminder emails were sent over the following three weeks (Dillman et al., 2009; Vaske, 2019).

Data were collected between June 4 to July 4, 2021, through a census survey of the University of Manitoba, Fort Garry campus users. An online questionnaire, hosted by SurveyMonkey was developed containing a variety of questions providing scale response options, open-ended questions, and multiple choice.

The questionnaire (see Appendix) contained the following seven sections, each of which was analyzed to achieve the objectives of this study:

- General wildlife value orientations

- Canada goose specific value orientations
- Attitudes about Canada geese on the U of M campus
- Attitudes about management options to reduce human-goose conflicts on campus
- Support for management options to reduce human-goose conflicts on campus
- Attitudes about specific management options in specific human-goose interaction scenarios
- User group demographic information

At the end of the survey period, raw, anonymized data was downloaded from the SurveyMonkey website into an Excel file. The raw data file was then uploaded to SPSS. Additional sampling and data analysis is described in chapters 2 and 3.

1.11 Research Relevance

This research will benefit the U of M in its current and ongoing Canada goose management by establishing a baseline of campus user groups' values and attitudes toward Canada geese and wildlife in general. It will also quantify the acceptance level for both lethal and non-lethal population controls in various human-goose interaction scenarios. This information should inform decision-makers and provide insight into acceptable management actions.

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Chapter 2. Understanding Differences in Campus Users' Values and Attitudes about Canada Geese

2.1 Introduction

Canada geese (*Branta canadensis*) populations have increased in North America and are now dispersed throughout Canada, the United States, and Mexico (McCoy, 2000). The *Migratory Birds Convention Act, 1994* provides a legal framework for the bird's protection across its range (Government of Canada, 2020) and is largely responsible for this recovery. Despite protection efforts, possibly indicating an appreciation for the species, Canada geese can also generate polarizing views.

Canada geese are highly adaptable and can often be found in urban areas where open, grassy spaces, coupled with minimal predators create near ideal nesting locations (Allan et al., 1995). Canada geese can provide ecosystem services such as nutrient cycling, hunting opportunities, food, ecotourism, esthetic value to urban spaces, (McCoy, 2000; Washburn et al., 2012; Green & Elmberg, 2014) which typically contribute to positive experiences with Canada geese. Conversely, Canada geese also provide disservices such as crop or landscape damage, fouling at beaches, and diminished air quality (Bakker et al., 2018; Buij et al., 2017; Fox et al., 2017) and can be territorial and protective, especially during nesting and brooding season (Clermont et al., 2019; Mississippi Flyway Council, 2017), which can lead to negative interactions with humans. The costs associated with repairing landscapes damaged by overuse by foraging geese and goose droppings can influence management actions (Allan et al., 1995). Identifying appropriate management options can be a challenge for authorities but can be guided by gaining a

better understanding of the factors that influence peoples’ values and attitudes toward wildlife and Canada geese specifically.

Previous research on Canada geese and human interactions has often focused on reducing conflicts (Washburn et al., 2012; Erikson et al., 2020; Henri et al., 2020) while others have focused on managing goose populations in urban environments (Gosser et al., 1997; Holevinski et al., 2007; Smith et. al, 2000).

This study understands campus users’ values and attitudes toward wildlife in general, Canada geese specifically and investigate the usefulness of wildlife value orientations to predict Canada geese value orientations (CGVO). In turn, this knowledge may contribute to improved decision-making regarding management of wildlife and specifically, Canada geese on the University of Manitoba campus.

2.1.1 Conceptual Framework

The conceptual framework for this study is based on the cognitive hierarchy (Fulton et al., 1996) where values form the foundational structure for attitudes, beliefs, and behaviours (Vaske et al., 1999). In this context, values are understood as “an enduring

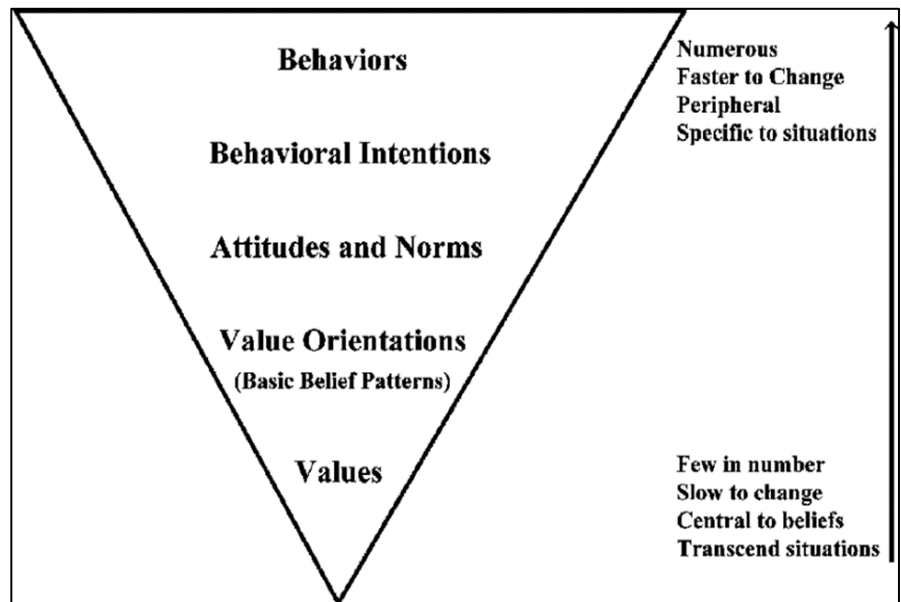


Figure 2.1 Cognitive Hierarchy, Vaske, J.J & Donnelly

belief” (Rokeach, 1973) that remain constant despite the situation or issue. Values are abstract cognitions that form an “individual’s hierarchical belief structure” but because of their abstract nature, values can also inform patterns of belief that guide behaviours leading to *value orientations* (Manfredo, et al. 2003).

2.1.2 Wildlife Value Orientations

Research specific to wildlife has identified two main value orientations: utilitarian and mutualist (Teel et al., 2005). The utilitarian value orientation places humans in a separate and superior role to wildlife, while the mutualism value orientation views wildlife in a more egalitarian relationship with humans (Teel et al., 2005; Jacobs et al. 2014; Manfredo et al. 2009). Within these two main orientations, four subtypes exist: *Utilitarian, Mutualist, Distanced and Pluralist*. Utilitarian subtypes believe wildlife should be used mainly for human benefit, managed accordingly and are more likely to place human well-being higher than wildlife in their attitudes and how they behave. This subtype is also more likely to find hunting and lethal removal of wildlife acceptable. The mutualist subtype believes wildlife have the capacity of trust relationships with humans, may be considered as part of an extended family and deserving of rights. This subtype is less likely to support human actions that could result in death or injury to wildlife and more likely to feed or participate in wildlife viewing opportunities. Pluralists hold both a utilitarian and mutualism value orientation to guide their attitudes in specific situations, meaning that in some scenarios, they may have a utilitarian response, while in other scenarios, they will express a mutualism value orientation. Finally, distanced subtypes hold neither a utilitarian nor mutualism orientation and are less interested in wildlife and related issues. This subtype is more likely to be

concerned with their safety in outdoor situations and may fear the possibility of negative wildlife encounters (Dietsch et al., 2011).

Human Dimensions research understands how people place values and why they hold the attitudes they do- this field of research is increasing. Studies have shown age can be a factor that influences attitudes toward wildlife and natural resources. Hansmann et. al (2020) compared attitudes between students and staff at a Swiss university. Students under the age of 25 showed the strongest mutualistic attitudes toward environmental issues. A similar study of wildlife value orientations and demographics in the Netherlands also produced findings indicating the older an individual is, the more likely they are to have doministic value orientations (Vaske et al., 2011). Numerous studies have demonstrated gender is also a factor that can influence attitudes and values toward wildlife. Males tend to have more utilitarian attitudes toward wildlife than females (Dogherty et al. 2003; Kellert & Berry, 1987). In fact, participants of a Swiss university study who identified as female showed a significantly higher level of mutualistic attitudes (Hansmann et. al, 2020). Rural upbringing and residency have also been shown to positively correlate with doministic value orientations vs an urban experience (Clark et al., 2017; Gamborg & Jensen, 2016; Zinn et al., 2002). Research into wildlife value orientations (WVO) has typically focused on wildlife reserves (Arjunan et al., 2006), cities and towns (Zinn et al., 1999), public lands (Clendenning et al., 2005).

2.1.3 Wildlife Value Orientations and Campus User

Many studies have focused on gender (Dogherty et al. 2003; Hansmann et al. 2020; Kellert & Berry, 1987) or age (Hansmann et. al ,2020; Vaske et al., 2011) as influencing factors on

attitudes and values toward wildlife in general. Other studies have focused on stakeholders, or specific interest groups such as hunters, farmers, landowners, and wildlife viewers (Liordos et al., 2017; Manfredi et al., 2003²; Gamborg et al., 2016), while the study of place-based experiences has provided an understanding of rural vs. urban residents' views toward wildlife (Eriksson et al., 2015; Gamborg et al., 2016; Liordos et al., 2017). Previous environmental related studies have examined the difference of attitudes of university campus students (Fernandez-Manzanal et al., 2007; Hermann et al., 2013; Vincente-Molina et al., 2013) however, little research exists to identify differences on university campuses between *faculty, staff and students* or how these demographic variables may influence environmental and more specifically, wildlife attitudes. One study of pro-environmental attitudes between university staff (technical staff, scientists, professors) and students found administrative and technical staff displayed the highest pro-environmental attitudes among survey participants, identified through a self-reporting “green identity” variable (Hansmann et al., 2020). This study illustrates the potential variety of attitudes on university campuses and the complexity of value orientations that can be influenced by the aforementioned factors.

2.1.4 Canada Goose Value Orientations and Campus users

People value Canada geese differently- some enjoy feeding these large birds, some enjoy watching them fly in their iconic V-formation, while others enjoy hunting them for food and recreation. These different and potentially competing interests can create challenges for decision-making authorities when management options need to be discussed. These differences, however, underscore the growing importance of understanding interest groups' values about

wildlife species, and in this case, Canada geese, to inform management plans that will be well received.

Coluccy et al. (2001) conducted a survey of Missouri residents' attitudes toward Canada geese and found 68% enjoyed seeing them and 42% of respondents felt the current population was manageable, implying a mutualism value orientation. In contrast however, landowners and respondents who had incurred property damage from the geese wanted fewer geese and were more likely to consider them a nuisance in the future, these attitudes are consistent with doministic orientations. Given the specific contexts of these two scenarios, the differences could also imply pluralist value orientations, thus underscoring the complexity of interest groups, the human dimensions field of research and wildlife management pressures. A similar study comparing attitudes and value orientations between two urban settings in Sweden found that in general terms, the places residents experienced geese (in parks, on beaches, in agricultural settings etc.) influenced positive or negative emotions; while the occurrence of geese was favourable, just under half of each town's respondents also felt the goose populations were too high. This indicates the potential for where and how people live to affect the acceptance of geese (Eriksson et al., 2020).

Value orientations studies focusing on specific species have shown differences between groups. Pro-conservation attitudes toward wildlife may depend on the degree that the species is liked or disliked. In fact, the literature suggests people will accept a problematic species more readily if it is well-liked compared to one that is less liked and/ or feared (Kaltenborn, 2006; Hartel et al., 2015). Grilli et al. (2018), used a willingness to pay model to predict tourists' specific WVOs toward conservation for wolves, lynx, and salamanders. That study determined that most tourists aligned with mutualism orientations and held a higher willingness to pay for

wolf and lynx conservation vs salamander conservation than locals. The authors attributed these differences to the degree each species was liked.

2.1.5 Wildlife Value Orientations as predictors of Canada geese Value Orientations

WVOs have been demonstrated to predict attitudes toward different wildlife related activities such as hunting, fishing as well as recreational activities such as wildlife viewing (Fulton et. al, 1996), though less work has focused upon the predictive nature of valuing specific wildlife species. Keener-Eck et al. (2020)'s study of WVOs and attitudes toward rattlesnakes shows that participants holding mutualistic WVOs were more likely to hold positive attitudes toward rattlesnakes in general and toward conservation and management efforts for this wildlife species. Conversely, those with doministic WVOs were more likely to place less value on rattlesnakes as they held little utilitarian value and were more commonly disliked. A comparable study to predict support for reintroduction of wolves and bison in Germany found participants with doministic WVOs had the lowest support for wolf, followed by bison recovery actions, possibly indicating a species preference, while mutualistic WVOs showed equal support for both species' reintroduction (Hermann (2013). Though these studies suggest mutualism is a better predictor of species-specific value orientations than the dominism, Jacobs (2007) and Sijtsma et al. (2012) found the opposite. Vaske et al. (2011) proposed this difference in predictive nature of mutualistic and dominism WVOs may depend on specific characteristics, such as rarity (Leong, 2010) and influences how humans view that species, underscoring that the context is also very specific.

2.2 Study Area

The University of Manitoba (Fort Garry Campus) occupies over 691 acres (contained on 3 sides by a river meander) adjacent to two suburban neighbourhoods (University of Manitoba, 2022). A decommissioned golf course sits north of the campus, a portion of which is under redevelopment as part of a campus expansion project. A large portion of the campus consists of experimental agricultural fields bordered by tree lines, small retention ponds, walking and bike paths. Student enrollment during the study timeframe (2021) was 31,037, academic staff population was 5252 with an additional 3838 support staff (University of Manitoba, 2022²). Although in-class attendance was cancelled due to Covid-19 restrictions, minimal staff were present on campus during the study.

2.3 Hypothesis

H₁: General Wildlife Value Orientations will significantly differ between campus users.

H₂: Canada geese Value Orientations will significantly differ between campus users.

H₃: General Wildlife Value Orientations will predict Canada geese Value Orientations among campus users.

2.4 Methods

Wildlife value orientations, a previously validated conceptual approach, was applied (Fulton et al., 1996), to Canada geese and to determine if similar doministic and mutualist value orientations could be identified among campus users. A small pilot exercise was conducted with

university students to fine tune questions and to determine if the final questionnaire would produce expected results. Feedback from the pilot group provided insight into question structure and online format useability. Some questions were revised for clarity prior to delivering the questionnaire to the campus population.

Data was collected from June 4 to July 1, 2021, using a self-administered online questionnaire, hosted by Survey Monkey. The survey was managed using a modified Tailored Design Method (Dillman, 2014) Campus users were initially contacted with a recruitment email explaining the purpose of the study using their university email account and invited to participate in the study by clicking a link to the online questionnaire. This was followed-up with a reminder email two weeks later, and a final reminder two weeks after that. Respondents self-identified in one of three categories: students, faculty or staff. The student category was expected to capture individuals registered in regular session as well as Continuing Education. Faculty was composed of professors, associate, and assistant professors and sessional instructors, while staff included administrative positions, hospitality service staff, and other service providers on campus. The sample of campus users was limited to 18 years and older, this was confirmed by asking their age in the questionnaire. A total of 2479 questionnaires were completed, a response rate of 5.09%. (The questionnaire was a research instrument used for a broader study and not all questions were used as part of this inquiry.)

Campus users were categorized as faculty, students and staff. To identify campus users' values and attitudes about Canada geese, a series of previously validated questions gauging general wildlife value orientations were asked. These questions were designed to identify two extreme value orientations: doministic and mutualistic. To determine if general WVOs would predict CGVOs, a second series of questions similar to the general wildlife value orientations but worded

to elicit specific responses about Canada geese were designed. Finally, a series of questions asking for age, years spent on campus, and gender identity were asked to ascertain if these factors demonstrated any influence on attitudes toward Canada geese.

2.5 Results and Analysis

Campus users consisted of students (n=1362), faculty (n=291), and staff (n=527), missing values were n=299. Respondents identifying as female accounted for 55.5%, followed by male identifying at 27.5%. Non-binary and respondents who preferred not to disclose accounted for a combined 4.3% and 0.4% identified as another identity. The average number of years spent on campus for students was 3.74 years, followed by staff at 12.5 years and finally faculty at 17 years on average.

A confirmatory factor analysis was performed on Fulton's wildlife value orientations to verify the construct of variables would remain valid in this study application. As expected, variables loaded into two extremes resulting in doministic and mutualistic components. Next, a reliability estimate was performed to determine the internal consistency of the two components. The domination component was tested using Chronbach's alpha.

ANOVA revealed a significant difference between groups' mean scores concerning domination (F=4.062, p=0.017) and mutualism (F=6.771, p=<0.001) general WVOs. Tukey's HSD post-hoc procedure identified a significant difference between students and staff (p= 0.012 and p=0.001) in both scenarios for domination and mutualism value orientations. No other significant differences were found between groups. All groups expressed similar dominism WVOs evidenced by the mean scores- 8.46, 8.61 and 8.96, however, staff's value orientations were

significantly more doministic than students. Mutualism WVO showed similar values among all groups as well, (44.35, 44.96, and 45.60), however, staff's mutualism WVOs were significantly more than students again, results are shown in table 2.1.

Table 2.1 Wildlife Value Orientations Differences Between Campus Users

| Dependent Variable | Independent Variable | Mean | F | P | Tukey's Honestly Significant Difference (HSD) | P |
|---------------------------|-----------------------------|-------------|----------|----------|--|----------|
| WVO Dominism | Between Campus Users | 8.60 | 4.062 | 0.017 | | |
| | Student | 8.46 | | | <i>Between Student and Faculty</i> | .775 |
| | Faculty | 8.61 | | | <i>Between Student and Staff</i> | .012 |
| | Staff | 8.96 | | | <i>Between Faculty and Staff</i> | .342 |
| | | | | | | |
| WVO Mutualism | Between Campus Users | 44.74 | 6.771 | 0.001 | | |
| | Student | 44.35 | | | <i>Between Student and Faculty</i> | .340 |
| | Faculty | 44.96 | | | <i>Between Student and Staff</i> | <.001 |
| | Staff | 45.60 | | | <i>Between Faculty and Staff</i> | .390 |

ANOVA revealed no significant difference concerning the domination CGVO between groups though a significant difference *was* found between campus users for the mutualism CGVO ($p < 0.001$). Tukey's HSD posthoc test identified a significant difference between

students and staff in the mutualism CGVO ($p < 0.001$). No other significant differences were found between groups. For both the dominism and mutualism CGVOs, the mean scores were similar within each variable (8.48, 8.31, 8.75 and 29.44, 30.75, 30.90 respectively), however staff are significantly more mutualistic about Canada geese than students. There were no other significant differences found, see results in table 2.2.

Table 2.2 Canada geese Value Orientations (CGVO) differences between campus users.

| Dependent Variable | Independent Variable | Mean | F | P | Tukey's Honestly Significant Difference (HSD) | P |
|---------------------------|-----------------------------|-------------|----------|----------|--|----------|
| CGVO Dominism | Between Campus Users | 8.52 | 1.869 | 0.155 | | |
| | Student | 8.48 | | | <i>Between Student and Faculty</i> | .732 |
| | Faculty | 8.31 | | | <i>Between Student and Staff</i> | .259 |
| | Staff | 8.75 | | | <i>Between Faculty and Staff</i> | .181 |
| CGVO Mutualism | Between Campus Users | 29.97 | 11.586 | <0.001 | | |
| | Student | 29.44 | | | <i>Between Student and Faculty</i> | 0.006 |
| | Faculty | 30.75 | | | <i>Between Student and Staff</i> | <0.001 |
| | Staff | 30.90 | | | <i>Between Faculty and Staff</i> | 0.950 |

A simple regression was used to determine if Wildlife Value Orientations (WVO) could predict Canada goose Value Orientations (CGVO) among campus users. The regression analysis shows WVOs explained 68% of the variance. WVOs significantly predicted CGVOs on campus with a moderate effect, these results are depicted in Table 2.3.

Table 2.3 Results of a linear regression analysis with Wildlife Value Orientations as the Independent variable and Canada geese Value Orientations as the dependent variable.

| Independent Variable | Dependent Variable | R | R Square | F-value | p-value |
|-----------------------------|---------------------------------|----------|-----------------|----------------|----------------|
| Wildlife value orientations | Canada geese value orientations | .830 | .689 | 5287.52 | <.001 |

To further explore the predictability of WVOs on CGVOs, doministic and mutualistic WVOs were used to predict doministic and mutualistic CGVOs. A simple linear regression was repeated using doministic and mutualistic variables from both the WVO and CGVOs. Doministic value orientations explained 65%. Mutualism value orientations explained 63%. Both results were significant with a moderate effect. Using the doministic value orientation was a slightly better predictor than the mutualism value orientation to understand how WVOs may predict CGVOs, see table 2.4.

Table 2.4 Results of a linear regression analysis with Canada geese Value Orientations-dominism and mutualism as dependent variables.

| Independent Variable | Dependent Variable | R | R Square | F-value | p-value |
|--|---|----------|-----------------|----------------|----------------|
| 1. Wildlife value orientation-domination | Canada goose value orientation-domination | .805 | .648 | 4402.28 | .001 |
| 2. Wildlife value orientation-mutualism | Canada goose value orientation-mutualism | .797 | .635 | 4144.91 | .001 |

2.6 Discussion

This study demonstrated a significant difference in general WVOs and CGVOs among campus users providing similar findings with Hansmann’s 2020 campus study on pro-environmental behaviours, supporting hypotheses #1 and 2.

The mean difference in mutualism WVOs and CGVOs between groups was more significant than the mean difference of dominism WVOs or the dominism CGVO which showed no significant difference between means at all. This indicates there is more variance between the groups tested for both mutualism scales than within groups. Additionally, there was a significant difference in both the mutualism WVOs and CGVOs among students and staff, while only the dominism WVO determined a significant difference between students and staff. The dominism CGVO had no significant difference between any campus user groups. These findings are consistent with Collucy’s 2001 study of Missouri residents’ attitude differences toward Canada geese that found significant differences between resident groups.

Given the unique conditions on the university campus (higher levels of education and typically urbanized), and the prevalence in the literature of females holding mutualist value

orientations, the significance of mutualism value orientations for both general wildlife and Canada geese specific value orientations was somewhat expected and may continue to grow in time as the general public's attitudes toward wildlife in general continue to change (George et al., 2016; Manfredi et al., 2003; Butler et al., 2003) from a protection-use orientation toward a wildlife appreciation orientation (Fulton et al., 1996). This shift has been attributed to increased affluence, urbanization and education that drive humans toward pursuits related to quality of life (Manfredi et al., 2003).

These differences may also be attributed to the amount of time spent on campus and place-based experiences with geese. Scenarios where people encounter geese more frequently (in urban settings) hold more negative emotions toward them and believe they provide fewer ecosystem services (Eriksson et al., 2020), though other studies indicate living near wildlife can have a positive effect on how people view and accept wildlife (Klich et al., 2018). Ultimately, the frequency and types of wildlife encounters can have different effects on peoples' perceptions and are very context specific (Colucci et al., 2001; Johansson et al., 2012; Kaltenborn et al., 2006)

General wildlife value orientations predicted Canada geese value orientations with a moderate effect. This supports hypothesis #3 that general WVOs would predict CGVOs among campus users. These findings conform to Keener-Eck et al.'s (2020) results showing participants with mutualistic WVOs held more positive attitudes toward specific species (rattlesnakes) and management of the species than those with doministic WVOs. Furthermore, general WVO dominism and mutualism variables significantly predicted CGVO dominism and mutualism variables, though the dominism value orientation was a slightly better predictor. This is consistent with research by Sijtsma et al. (2012) on the predictability of WVOs and acceptability of lethal management. Jacobs et al. (2014) also found that the dominism value orientation was a

better predictor, however, only in situations where humans and wildlife had problem encounters, mutualism was a better predictor in non-conflict scenarios.

Conversely, in Sijtsma et al.'s 2011 study on mutualism and dominism value orientations' influence on the level of acceptability of lethal control on geese, the dominism value orientation proved to be a better predictor, indicating this value orientation may have more influence in conflict situations (Vaske et al., 2011). Despite this reasoning, 35% remains unexplained. This unaccounted variability could be the result of an almost three-fold response rate from students who are typically younger in age and spend less time on campus, and over half being female, two demographics that typically trend toward mutualism value orientations (Dogherty et al., 2003; Kellert & Berry, 1987; Hansman et al. 2020; Liordos et al., 2013; Serenari et al., 2015; Vaske et al., 2011). Species preference may also be a factor, with respondents favouring Canada geese when confronted with a choice between them and wildlife in general (Kaltenborn et al., 2006).

2.7 Conclusion

This study tested the notion that general wildlife value orientations and Canada geese specific value orientations would be different between groups on a university campus. It revealed that the difference between campus users in mutualism WVOs were more significant than in the dominism WVOs. A significant difference between students and staff was also found in both general wildlife mutualism and dominism value orientations. These are important findings as they suggest there may not be total consensus within groups aligning with a mutualistic or doministic value orientation. The campus community provides an interesting cross-section of

society in the multi-ethnic, age, gender, place-based experience and educational makeup of post-secondary institutions. The existence of a somewhat short-term and transient population (students) contrasted with the long-term and stable nature of staff and faculty also adds a time factor to consider.

Covid-19 restrictions resulted in most campus users' complete absence from the university during this study period which could have influenced their place-based experience with Canada geese. More investigation into the drivers behind these differences such as age, gender, time spent on campus and place-based experiences may provide a clearer understanding of why this divide exists and why staff and student groups aligned the way they did. Further study focusing on these factors could also provide a clearer understanding of WVOs held on campus. Covid-19 restrictions have since been lifted and on-campus activities have returned to normal. Repeated studies could offer insight into the effects of limited interactions with wildlife or specific species and humans' value orientations (associated with Covid restrictions), identify trends in WVOs as the campus population demographics change and substantiate those trends. Such longitudinal studies also assist managers in understanding how management actions taken may be influencing attitudes creating thus attitudinal monitoring which can also be used to identify any sudden changes or triggers to change that may need to be addressed.

This study also examined the use of WVOs to predict Canada goose value orientations, which demonstrated a functional predictability in this case, but still had some unexplained variability. The use of doministic or mutualistic value orientations as predictors needs to be carefully considered. There are several influences that could affect the reliability of the prediction such as rarity or how well-liked the species is. In the end, the context in which a predictive study is undertaken must take these contextual factors into consideration.

Finally, a comparative study of campus and surrounding neighborhoods could provide further insight into similarities or differences between campus attitudes and values and those of the sub-urban residents in the surrounding area.

2.8 Chapter 2 Bibliography

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Chapter 3. Acceptance of lethal population management techniques in human-goose interaction scenarios on University of Manitoba campus.

3.1 Introduction

Canada goose populations across Canada have increased over recent decades. In Manitoba, the temperate-breeding population is three times more than the population target set in the 1990s and has now been designated as overabundant (Environment and Climate Change Canada, 2022). The Migratory Birds Regulations, 2022 define overabundance as “a species of migratory game bird that causes damage or is likely to cause damage to agricultural, environmental or other similar interests as a result of the rate of increase of the population of that species or the abundance of that population” (Government of Canada, 2023).

Geese can provide a number of benefits to humans such as hunting opportunities, ecotourism, recreational viewing, and esthetic experience (Green & Elmburg, 2014); however, overabundant populations can lead to increased conflicts with humans (Conover and Chasko 1985). Increased bird strikes, goose feces in public spaces, crop damage, damage to vegetation and landscaping, and concerns of zoonotic disease transmission to humans are all considerations of increased goose-human interactions (Buij et al., 2017; Fox et al., 2017; Smith et al., 2000).

Non-lethal approaches to Canada goose management include hazing (intentional disturbance) using pyrotechnics, noise-making devices, landscape modification, trained dogs, translocation, and other similar approaches to scare geese away from areas where their presence is undesirable or incompatible with human uses (Smith et al., 2000; Swift, 2000; Tobin et al. 2002). These methods are typically used to prevent geese from nesting. Though effective, these

methods may not be well-received in urban settings due to their disruptive nature. Translocation may also create undesired conflicts in other areas where geese are moved to. Once nesting areas are established, the focus often turns to managing the flock size. Reducing the flock depends on lethal methods that can range from different egg manipulation techniques (oiling, adding or puncturing) to reduce hatching success and the use of oral contraceptives. These options are perhaps less noticeable in urban environments because geese are still present on the landscape but require constant involvement and monitoring. Capture and euthanizing geese in a “round-up”, drive trapping and translocation all have immediate effects on goose populations in urban situations. These techniques are controversial as lethal options are often unacceptable in urban communities (Preusser et al., 2008). Although hunting is often incompatible in an urban environment, translocation often simply moves geese from an urban environment to a rural locale where they *can* be hunted (Smith et al., 2000; Preusser et al., 2008).

Support for management options often depends on how the public values geese. Values are understood as being a foundational element of a person’s belief system and provide the basis for how humans view the environment (Vaske et al., 1999). Further study into this concept has shown values influence and may predict the public’s acceptance of different management options. In Hanley et al., 2003, researchers found the general public in Scotland were in favour of conserving geese in contrast to another study that found nearly half of the general public in the Netherlands supported killing geese in areas that saw crop damage (Sijtsma et al., 2012). Although these two studies provide insight into different populations’ acceptance of geese, it’s not clear how they value geese specifically. The cognitive hierarchy (Fulton et al., 1996) helps to demonstrate how humans develop values, attitudes, and value orientations. Within this concept, two main WVOs have emerged- domination and mutualism (Teel & Manfredi, 2010; Sijtsma et

al., 2012) that can help understand and predict the public's acceptance. These two main wildlife value orientations can be further classified into four subtypes: utilitarian, mutualist, distanced and pluralist. While individuals in the utilitarian and mutualist subtypes align with each end of the domination-mutualism spectrum (human supremacy to reciprocity), the pluralist subtype exists somewhere in between these extremes, and is dependent on context and specific situational factors. The distanced subtype on the other hand, has little to no interest in wildlife or issues related to wildlife and may carry a higher degree of concern for their safety in outdoor settings (Dietsch et al., 2011). What is less known however, is how a *species-specific* value orientation may predict acceptance of management options.

The University of Manitoba is an urban setting that supports a variety of wildlife on campus including fox, white-tailed deer, raccoons, owls, Canada geese, songbirds, and others. The University operates using a Wildlife Management Plan aimed at promoting co-existence between humans and all wildlife species on campus. In 2017, controversy arose on campus following complaints that some staff had used baseball bats to crack unhatched eggs to reduce hatch success (Canadian Broadcast Corporation, 2017). Shortly after, an online petition was started to pressure the University into a “no-cull” management approach which was signed by over 1300 supporters (Leboe-McGowan, 2017). As part of the campus wildlife management approach, a Goose Education and Awareness Committee was formed to develop and disseminate educational resources. The committee produces articles published and distributed through the University's online news format, maintains a section on the wildlife management plan webpage with information for readers to prepare for seasonal goose population influxes, and provides a reporting line for aggressive, injured and other incidents with geese on campus (University of Manitoba, 2024).

The range of wildlife value orientations, and diversity of potential interest groups affected by management policies and actions highlights the complexity wildlife managers face when making decisions. Understanding interest groups' values and attitudes toward a target species can provide insight into acceptable management measures, and awareness to minimize conflicts between groups.

3.1.1 Potential for Conflict Index

Human dimensions research often employs questionnaires to better understand concepts such as motivations, attitudes, and norms all with the aim of improving management decisions (Vaske, 2010). Different approaches exist to analyze results; however, the Potential for Conflict Index (PCI₂) was developed to provide a graphic representation of the central tendency, dispersion, and form of a distribution (Manfredo et al., 2003, Vaske et al., 2010). Since its development, it has proven a key tool in conveying consensus and conflict in human dimensions research. The PCI₂ ranges from 0 to 1 where the least consensus on an issue and thus the greatest conflict (PCI₂=1) occurs when responses are equally divided across the response scale (e.g., 50% strongly support, 50% strongly oppose and 0% are neutral) (Manfredo et al., 2003). Conversely, complete consensus and zero potential for conflict (PCI₂=0) occurs when the distribution is 100% on one point of the response scale.

The PCI₂ uses bubble graphs to visualize data, thus making this analysis very successful when conveying information to non-technical audiences. Each bubble represents one issue and depicts the magnitude of the PCI₂ and indicates the amount of dispersion, shown by bubble size. A small bubble represents a lower potential for conflict (i.e., high consensus), while a larger bubble indicates a larger potential for conflict (i.e., low consensus). The center of each bubble signifies the mean acceptance of the action as plotted on the y-axis, while the location of the

bubble in relation to the neutral point demonstrates if respondents' average evaluations for a variable are above, below or neutral (i.e., respondents would, on average find a management action acceptable, unacceptable, or would be neutral) (Vaske et al. 2010).

3.2 Hypothesis

The objectives are to 1) identify and document acceptance of lethal population management options in different human-geese interaction scenarios, and 2) examine the potential for conflict index related to acceptance of lethal population management in three human- goose interaction scenarios. The following hypothesis were explored:

H₁: Canada goose Value Orientations will predict acceptability of lethal management approaches in specific human- goose encounters.

H₂: There will be less consensus for lethal population control among campus users as management options become more extreme.

H₃: Consensus of lethal population management will vary between campus users.

3.3 Methodology

3.3.1 Study area

The University of Manitoba (Fort Garry Campus) is located in the southern portion of the City of Winnipeg and spans over 691 acres (University of Manitoba, 2022). To the north of the current campus lies a decommissioned golf course which has been identified as part of a campus expansion. The campus is laid out with interconnected buildings near its center and experimental agricultural fields, as well as small retention ponds, walking and bike paths.

For this study, campus users are defined as either a faculty member, a staff, or a student. During the study timeframe (2021), there were 31,037 students, 5252 academic staff and 3838 support staff (University of Manitoba, 2022²). Due to Covid-19 restrictions, in-person classes were cancelled and access to campus was restricted, minimal staff were present on campus during the study

3.3.2 Questionnaire design

A seven-part questionnaire was developed and submitted to the Research Ethics Board at the University of Manitoba (Protocol # R2-2021:022 (HS24725)). The questionnaire was piloted with a university class to seek specific feedback on the design, length and clarity of questions. Minor adjustments to language were made based on feedback. Part 1 of the questionnaire asked about general wildlife views; part 2, general views about Canada geese; part 3 about views about Canada geese on the University of Manitoba campus; part 4 asked about attitudes toward Canada geese management options on the University of Manitoba campus; part 5 asked about support for Canada goose management options on the University of Manitoba campus. Each of these sections asked participants to respond to questions using a 5-point Likert-like scale using “Strongly disagree” (-2), “Somewhat disagree” (-1), “Neither disagree nor agree (0), “Somewhat agree” (+1), “Strongly agree) (+2). Part 6 contained items about attitudes toward management options in specific Canada goose- human interaction scenarios on the campus. Under each scenario, the following management options were provided: 1) do nothing; 2) relocate that nesting pair; 3) remove (kill) that nesting pair; 4) relocate entire family; 5) remove (kill) entire family; 6) use a contraceptive program to reduce overall campus population; 7) increase public education. For each scenario, respondents were again offered the following 5-point scale: “Strongly disagree” (-2), “Somewhat disagree” (-1), “Neither disagree nor agree (0), “Somewhat

agree” (+1), “Strongly agree) (+2). Part 7 included sociodemographic questions including the type of campus user, faculty affiliation, years spent on campus, gender identity, and age.

3.3.3 Sampling Protocol

The sample was collected using an online questionnaire hosted by Survey Monkey between June 4 and July 1, 2012. Ethics approval was obtained from the Research Ethics Board at the University of Manitoba prior to distribution. A recruitment email was sent to the entire University of Manitoba community ($n= 48,639$) on June 4 with follow-up reminder emails on June 16 and June 28, 2021, similar to Dillman’s (2014) recommended Total Design Method (TDM). The recruitment email explained the study and provided a “click through” link to the online questionnaire. All respondents were informed their participation was voluntary and that they could withdraw at any time from the study. 2479 questionnaires were submitted through the online portal, for a response rate of 5.09%.

3.4 Data analysis

To test if CGVO could predict acceptability of lethal management options, a stepwise multiple linear regression was performed using the Statistical Package for the Social Sciences (SPSS) V27. Three human-geese interaction scenarios were selected: 1) A pair of Canada geese near a nest with eggs show aggression by hissing and opening their wings (in a threat display) to challenge humans in a highly used area; 2) A pair of Canada geese charge humans who got too close to their nest in a high traffic area; 3) A pair of Canada geese attack humans in a high traffic area. For each scenario, respondents were given the following options regarding their preferred management approach: do nothing; relocate that nesting pair, remove (kill) the nesting pair, relocate the entire family, remove (kill) entire family, use a contraceptive program, increase public education.

Consensus among campus users for lethal population control of Canada geese was measured by first recoding variables for analysis (-2 to +2) then using PCI₂ (Vaske et al. 2010). The difference of consensus between campus users was calculated using software for comparing two PCI values available from Colorado State University (Vaske, 2014) where if $d > 1.96$, the difference is statistically significant at $p < 0.05$.

3.5 Results

Responding campus users were composed of 63% students, 13% faculty and 24% staff. Respondents under 18 were removed, leaving the remaining ages ranging from 18-90, with 45% being 25 years old or less. 63% reported as female, 31% as male, 2% as non-binary, 3% preferred not to disclose and >1% identified as another gender identity.

The dependent variables used in the stepwise multiple linear regression were: remove (kill) the nesting pair and remove (kill) entire family for each human-geese interaction scenario. Independent variables used were entered in the following order: CGVO, Wildlife Value Orientation (WVO), age, years spent on campus. In each analysis, age and years on campus did not meet the significance level and were rejected by the model.

For scenario 1, lethal option 1, the CGVO explained 33% of variation in acceptability of killing the nesting pair ($R^2 = .332$). $F(1) = 924.01$, $p < .001$. In option 2, the CGVO explained 27% of variation in acceptability of killing the entire family ($R^2 = .272$). $F(1) = 728.17$, $p < .001$. For scenario 2, lethal option 1, the CGVO explained 33% of variation in acceptability of killing the nesting pair ($R^2 = .331$), $F(1) = 957.50$, $p < .001$. In lethal option 2, the CGVO explained 29% of variation in acceptability of killing the entire family ($R^2 = .291$), $F(1) = 795.14$, $p < .001$. For scenario 3, lethal option 1, CGVO explained 36% of variation in acceptability of killing the

nesting pair ($R^2=.360$), $F(1)=1086.44$, $p<.001$. In lethal option 2, the CGVO explained 32% of explained variation in acceptability of killing the entire family ($R^2=.318$, $F(1)=902.54$, $p<.001$).

Based on these findings, the CGVO was able to predict the acceptability of both lethal management options in each human-goose interaction scenario, with statistical significance.

Table 3.1. Results of a stepwise multiple linear regression analysis with “remove (kill) nesting pair” and “remove (kill) entire family” as dependent variables.

Table 3.1 Results of a stepwise multiple linear regression analysis showing three conflict scenarios with "remove (kill) nesting pair" and "remove (kill) entire family" as dependent variables.

| Scenario | | R ² | F-value | p-value |
|--|--|----------------|---------|---------|
| 1.A pair of Canada geese near a nest with eggs show aggression by hissing and opening their wings (in a threat display) to challenge humans in a highly used area. | CGVO→ Acceptability of “remove (kill) nesting pair” | .332 | 924.01 | <.001 |
| | Acceptability of “remove (kill) entire family” | .272 | 728.17 | <.001 |
| | CGVO, WVO→ Acceptability of “remove (kill) nesting pair” | .339 | 497.91 | <.001 |
| | Acceptability of “remove (kill) entire family” | .285 | 388.61 | <.001 |
| 2. A pair of Canada geese charge humans who got too close to their nest in a high traffic area. | CGVO→ Acceptability of “remove (kill) nesting pair” | .331 | 957.50 | <.001 |
| | Acceptability of “remove (kill) entire family” | .291 | 795.14 | <.001 |
| | CGVO, WVO→ Acceptability of “remove (kill) nesting pair” | .348 | 516.26 | <.001 |
| | Acceptability of “remove (kill) entire family” | .310 | 435.21 | <.001 |
| 3.A pair of Canada geese attack humans in a high traffic area. | CGVO→ Acceptability of “remove (kill) nesting pair” | .360 | 1086.44 | <.001 |
| | Acceptability of “remove (kill) entire family” | .318 | 902.54 | <.001 |

| | | | | |
|--|--|------|--------|-------|
| | CGVO, WVO→ Acceptability of “remove (kill) nesting pair” | .376 | 582.58 | <.001 |
| | Acceptability of “remove (kill) entire family | .335 | 485.70 | <.001 |

The consensus for lethal management analysis relied on the same three scenarios (i.e., geese show aggression, geese charge humans, geese attack humans). For scenario 1, nearly all respondents disagreed with using lethal management options. 85% ($n= 1853$) disagreed with the option to “remove (kill) nesting pair” (faculty: $\bar{x}= -1.53$, $PCI_2= 0.16$; staff: $\bar{x}= -1.49$, $PCI_2=0.22$; students $\bar{x}= -1.43$, $PCI_2= 0.25$). Slightly more (87%, $n=1896$) disagreed with the option to “remove (kill) entire family”, (faculty: $\bar{x}= -1.56$, $PCI_2= 0.17$; staff: $\bar{x}= -1.55$, $PCI_2=0.21$; students $\bar{x}= -1.49$, $PCI_2=0.24$). 79% ($n= 1720$) agreed with the option to “increase public education” (faculty: $\bar{x}= 1.21$, $PCI_2= 0.14$; staff: $\bar{x}= 1.30$, $PCI_2= 0.15$; students $\bar{x}=1.17$, $PCI_2= 0.23$). Differences in PCI_2 (d) between campus groups varied from 0.01-0.04; none of these results were statistically significant.

Out of all management options for this scenario, “increase public education” had the highest consensus (smaller PCI_2 values) ranging from 0.14 to 0.23 across campus users, in contrast to the two lethal management options “remove (kill) nesting pair) and “remove (kill) entire family” with PCI_2 values ranging from 0.16-0.25 and 0.17-0.24 respectively across all campus users for these two options.

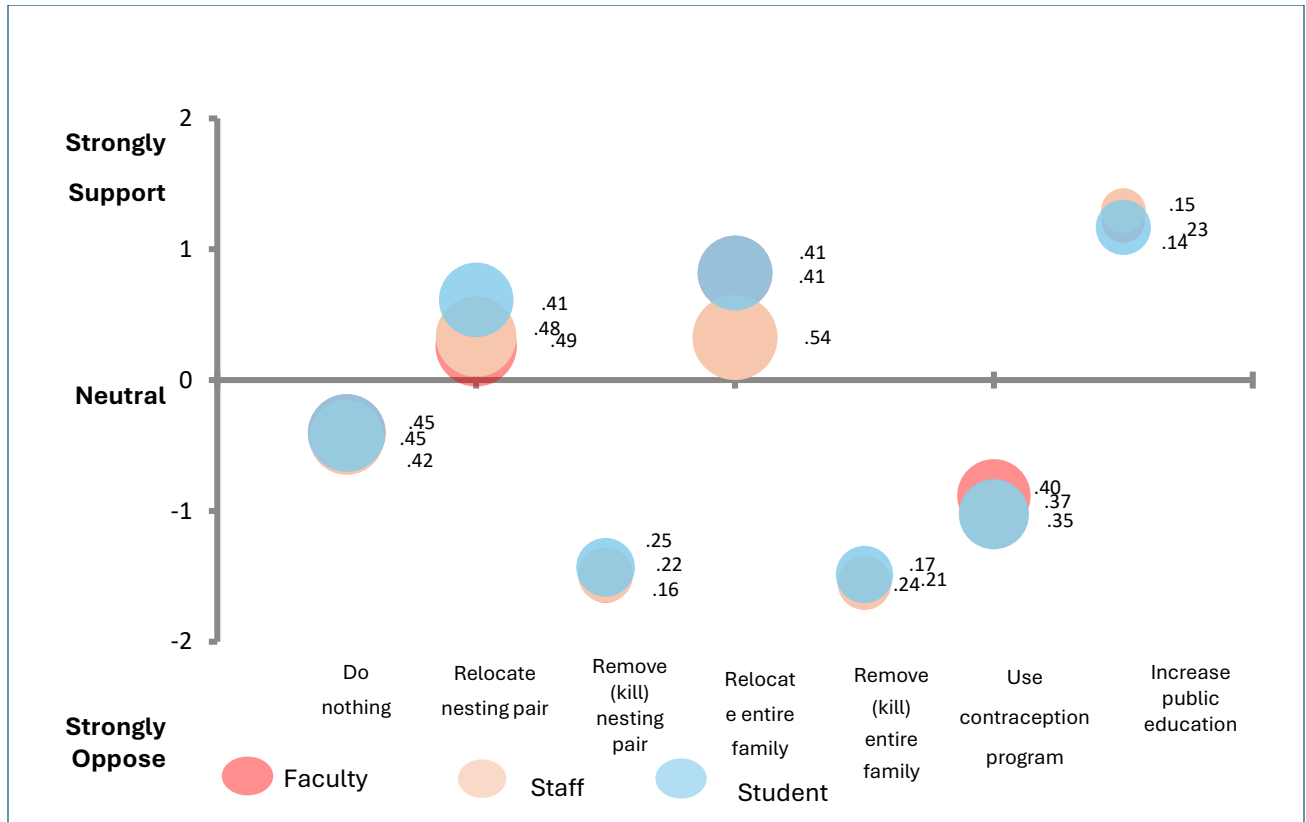


Figure 3.1 Potential for Conflict Index $_2$ (PCI $_2$) values for seven management options in scenario 1: A pair of Canada geese near a nest with eggs show aggression by hissing and opening their wings (in a threat display) to challenge humans in a highly used area, obtained through a study of University of Manitoba, Fort Garry campus values and attitudes about Canada geese.

For scenario 2, nearly all campus users disagreed with the lethal options to “remove (kill) nesting pair” (85%, $n=1830$, faculty: $\bar{x} = -1.52$, PCI $_2 = 0.20$; staff: $\bar{x} = -1.50$, PCI $_2 = 0.24$; students $\bar{x} = -1.39$, PCI $_2 = 0.29$) and “remove (kill) entire family” (86%, $n=1866$, faculty: $\bar{x} = -1.56$, PCI $_2 = 0.19$; staff: $\bar{x} = -1.54$, PCI $_2 = 0.20$; students $\bar{x} = -1.45$, PCI $_2 = 0.27$). The preferred management option was to “increase public education” (79%, $n=1717$, faculty: $\bar{x} = 1.24$, PCI $_2 = 0.17$; staff: $\bar{x} = 1.34$, PCI $_2 = 0.14$; students $\bar{x} = 1.18$, PCI $_2 = 0.24$). Differences in PCI $_2$ (d) between campus groups varied from 0.02-0.04; none of these results were significant.

Out of all management options for this scenario, “increase public education” had the highest consensus ranging from 0.17-0.24 among all campus users, in contrast to the disagreement with the two lethal management options ranging from 0.19- 0.29 across campus users for these two options.

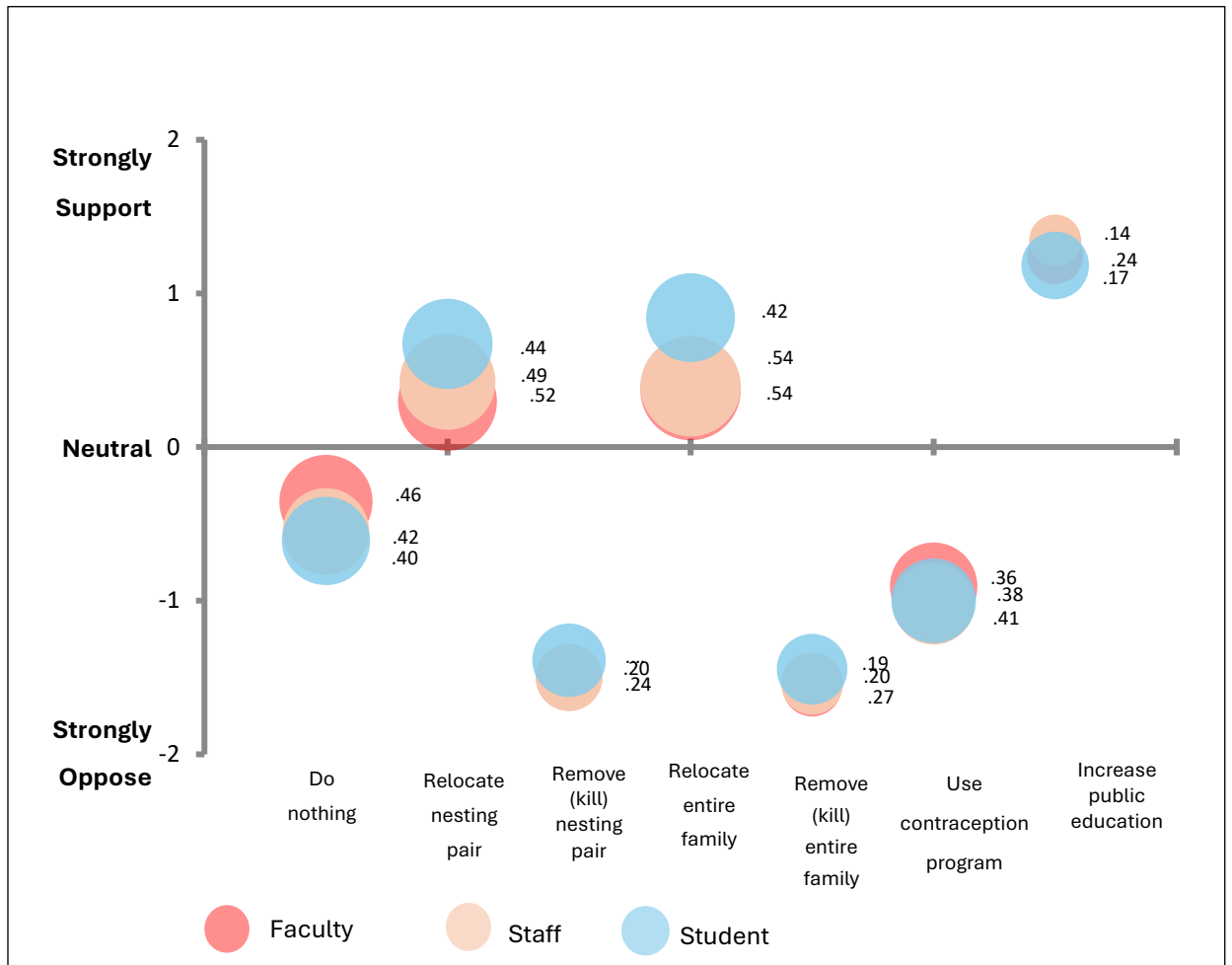


Figure 3.2 Potential for Conflict Index₂ (PCI₂) values for seven management options in scenario 2: A pair of Canada geese charge humans who got too close to their nest in a highly used area, obtained through a study of University of Manitoba, Fort Garry campus values and attitudes about Canada geese.

In scenario 3, most campus users disagreed with lethal management options. In the option “remove (kill) nesting pair”, 80% ($n=1729$) disagreed, faculty: $\bar{x} = -1.37$, $PCI_2 = 0.30$;

staff: \bar{x} = -1.39, PCI_2 = 0.31; students \bar{x} = -1.22, PCI_2 = 0.39). Slightly more campus users (83%, $n=1789$), disagreed with the option to “remove (kill) entire family” (faculty: \bar{x} = -1.42, PCI_2 = 0.27; staff: \bar{x} = -1.48, PCI_2 = 0.24; students \bar{x} = -1.34, PCI_2 = 0.32). Most campus users (80%, $n=1718$) agreed with the management option to “increase public education” (faculty: \bar{x} = 1.31, PCI_2 = 0.15; staff: \bar{x} = 1.36 PCI_2 = 0.16; students \bar{x} = 1.21, PCI_2 = 0.25). Differences in PCI_2 (d) between campus groups varied from 0.01-0.05; none of these results were significant.

Management options with the highest consensus were agreement with “Increase public education” ranging from 0.15-0.25, followed by disagreement with the two lethal management options ranging from 0.24- 0.39 across these two options .

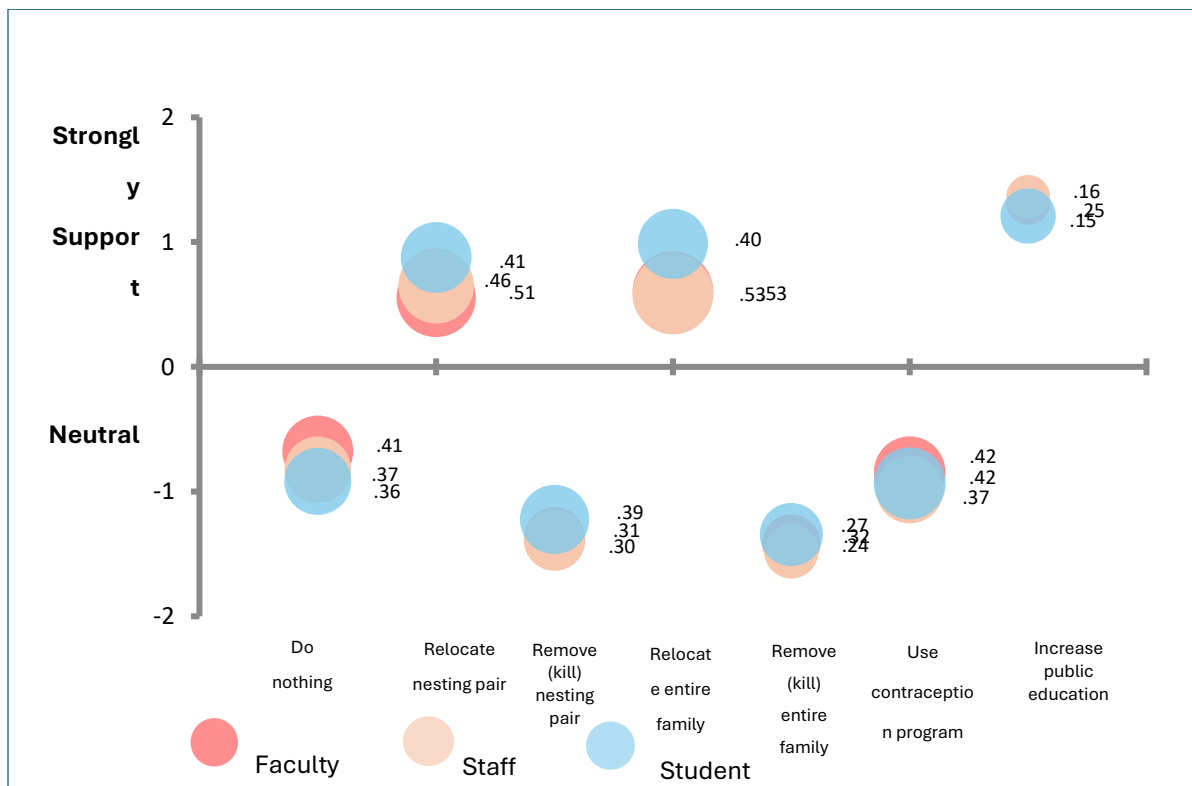


Figure 3.3 Potential for Conflict Index₂ (PCI_2) values for seven management options in scenario 3: A pair of Canada geese attack humans in a high traffic area, obtained through a study of University of Manitoba, Fort Garry campus values and attitudes about Canada geese.

For scenario 1, the option “remove (kill) nesting pair”, had no significant difference in consensus between faculty/staff ($d=1.3$), staff/students ($d= 0.85$), however, the difference in consensus between students/faculty was significant ($d= 2.19$). For the option “remove (kill) entire family” there was no significant difference in consensus between any campus groups: faculty/staff ($d=0.81$), staff/ students ($d=0.84$), student/faculty ($d=1.61$). In scenario 2, the option “remove (kill) nesting pair”, had no significant difference in consensus between faculty/staff ($d=0.8$), staff/students ($d=1.39$), however there was a significant difference in consensus between students/faculty ($d=2.01$). For the option “remove (kill) entire family”, there was no significant difference in consensus between any campus groups: faculty/staff ($d=0.2$), staff/ students ($d=1.87$), students/ faculty ($d=1.84$). In scenario 3, the option “remove (kill) nesting pair” had no significant difference in consensus between faculty/staff ($d=0.18$), students/ staff ($d=1.94$) or students/faculty ($d=1.83$). For the option “remove (kill) entire family”, there was no significant difference in consensus between, faculty/staff ($d=0.56$), or students/faculty ($d=1.03$), however, there was a significant difference in consensus between staff/students ($d=2.14$).

3.6 Discussion

Three human-geese interaction scenarios were used to test the predictability of campus users’ acceptance and consensus of lethal management options for Canada geese, these were 1) a pair of Canada geese near a nest with eggs show aggression by hissing and opening their wings (in a threat display) to challenge humans in a highly used area; 2) a pair of Canada geese charge humans who got too close to their nest in a high traffic area; 3) a pair of Canada geese attack humans in a high traffic area. For each of these scenarios, the same two lethal management options were presented: a) remove (kill) nesting pair, and b) remove (kill) entire family.

Campus users participating in this study did not accept any scenario using lethal management, limiting the University to relocation and public education approaches if it wishes to avoid conflict. Public education was the most preferred option, though the questionnaire did not specify what type of education this may be and left it open to personal interpretation. Education on the need for lethal management, or education on how to avoid conflicts could both be viable options. This study does confirm however, that respondents seem willing to accept further educational messages regarding geese-human interactions and possibly appropriate management actions.

The Canada Goose Value Orientation (CGVO) proved to be an effective predictor of how acceptable lethal management options might be to campus users. In the first lethal management scenario (geese hissing), the CGVO explained 33% of the variation in respondents' acceptance of killing the nesting pair, while it explained only 27% of variation in acceptance for killing the entire family. In the second lethal management scenario (geese charge humans), the CGVO again explained 33% of the variation in acceptability of the nesting pair, but slightly more (29%) in variation of acceptability for killing the entire family than the first scenario. In the final lethal management scenario (geese attack humans), the CGVO accounted for the highest variation of acceptability for killing the nesting pair (36%) and for killing the entire family (32%) among all scenarios tested. These findings are consistent with similar studies examining the relationship between specific species and the acceptance of lethal management. A multi-species study including lions, cheetah, leopards and elephants in Serengeti National Park, found the more positive a respondent felt toward a specific species, the less accepting they were toward lethal management options in minor conflict situations (animal seen close to village) (Kaltenborn et al.,

2006). As the severity of the problem escalated (threatening a human), respondents supported lethal management regardless of their preference toward the wildlife species. In contrast however, species preference determined no effect on how respondents felt about management options toward elephants in any of the scenarios examined. In Coluccy et al., 2001, respondents were generally opposed to lethal goose management, however, 71% would support lethal management in specific cases where geese caused damage (to property). Additionally, 13% of this sample (in Coluccy et al.'s study) indicated they would support killing geese if done humanely. The word "humanely" was not used in the scenarios from my thesis nor was a scenario of damage to property considered like in Coluccy et al.'s work. The lack of support for lethal management on the university campus may be due to a lack of perception of damage or the nature birds would be killed. It may also be due to the nature of the sample of younger students, staff and possibly faculty suggesting the importance of situational context. Finally, in Locker et al. (1999), the relationship between the *level of concern* (nuisance, damage-aesthetic, human health and safety) with a specific species (deer, beaver and Canada geese) was examined to predict the acceptability of lethal management actions. In general, the more severe the concern, the more likely the respondent was to support invasive or lethal options.

These findings illustrate the similarities and complexities when examining the role of a specific species and acceptable management options. Kaltenborn (2006) suggests the most liked species have a usefulness to humans and typically do not pose a danger to humans. Animals that pose a danger, or that are *perceived* to pose a danger to humans typically had no effect on the acceptance of lethal management.

As expected, consensus about lethal management options diminished as options became more extreme in each human-goose scenario. In each scenario, consensus was formed in

opposition (strongly oppose) to killing a pair of geese, or the entire family. The first scenario was the lowest severity of interaction, however, as the interactions became more severe, or had a higher chance of injuring a human, consensus for lethal management grew, even though respondents were still strongly opposed to this management approach. Similar results were found in Liordos et al. (2017) where lethal control became more acceptable with increasing severity of the conflict between corvids, starlings and nutria in Greece. In Kaltenborn et al.'s 2006 study, lethal control became more acceptable as the severity of scenarios increased as well, despite previously documented preferences for different wildlife species. In Coluccy et al., 2001, respondents were generally opposed to lethal goose management, however, 71% would support lethal management in specific cases where geese caused damage (to property).

Determining consensus for lethal management appears to be linked to the level of humans' tolerance of wildlife species and in some cases, can depend on a hierarchy of species.

Consensus of lethal population management options varied between campus users. In the first scenario, the consensus between staff/ students was the highest, followed by faculty/ staff, though this difference was not significant. The least consensus was between students and faculty that significantly differed in their consensus to remove (kill) the nesting pair. The option to remove (kill) the entire family did not reveal any significant differences in consensus among any user groups. In the second scenario, there was only a significant difference in consensus to remove (kill) the nesting pair between students and faculty. Similar to the first scenario, there was no significant difference in consensus among any campus users toward the option to remove (kill) the entire family. The last scenario did not identify any differences in consensus for removing (killing) the nesting pair among any campus users, however, there was a significant,

low consensus between staff and students regarding removing (killing) the entire family, however.

The variance in consensus among campus users could be attributed to the frequency of encounters with geese and not just the severity of the encounter (Hennegan & Morse, 2019) or whether respondents had a rural or urban upbringing (Smith et al., 2014), or are hunters or farmers (Liordos et al. 2017). Different user groups' opposition to lethal management options may also be influenced by their preference for Canada geese in relation to other wildlife species on campus (Zinn et al., 2000).

3.7 Conclusion

This study is the first of its kind on the University of Manitoba Fort Garry that identified and documented acceptability of lethal population management techniques in human-goose interactions on campus. Here, the use of a species-specific value orientation was used to predict acceptability of lethal management options on the University of Manitoba, Fort Garry campus. In each scenario tested, the Canada goose value orientation predicted acceptability of the lethal option to kill the nesting pair or kill the entire family of geese. The PCI₂ was used to measure consensus among campus users toward lethal management options. In this case, all campus users were opposed to killing the nesting pair and the entire family. Though the consensus between groups varied, there was less consensus as the human-goose scenario became more extreme. This suggests that campus users are less accepting of Canada geese if they pose a threat to humans or their safety. The management option in each scenario with the most support was to increase public education. These findings support the University's approach of prioritizing public

education as a means to reduce human-goose conflict over lethal management of geese.

Consensus for lethal management among campus users varied depending on the specific scenario and on whether the option was to kill the nesting pair or the entire family.

More research should be conducted to understand wildlife value orientations toward other species on campus such as white-tailed deer, raccoons, coyotes and if preferences exist among these species and Canada geese. Expanding this study to examine different human-goose scenarios may provide valuable insight into thresholds of opposition and when campus users may support lethal management. Future studies that include adjacent neighbourhoods and other campus user groups may also provide insight into the various interest groups using the campus and their values and attitudes toward Canada geese on campus.

3.8 Chapter 3 Bibliography

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Chapter 4. Summary

This chapter provides a summary of research findings, contributions this research project may provide to existing literature and recommendations and considerations for future wildlife-oriented research on the University of Manitoba campus.

4.1 Discussion

The potential for negative interactions between humans and Canada geese in urban settings will likely increase as populations grow. Canada geese are a highly adaptable species in urban environments and will defend their territories. Values and attitudes toward Canada geese on the University of Manitoba campus indicate a spectrum of interest groups, further highlighting the need for informed management approaches that consider both the fundamentals of population management along with human dimensions.

The research objectives to identify and understand differences in campus users' values and attitudes about Canada geese, and to identify acceptance of lethal population management in different human- geese conflict scenarios were addressed in chapters 2 and 3, respectively. The findings this research uncovered provides insight into how different campus user groups view Canada geese and could possibly be applied to similar environments.

First, chapter 2 identified general wildlife differences in the domination and mutualism value orientations between campus users, with the most significant difference being between students and staff. When examining the value orientation for Canada geese, only the mutualism value orientation was significantly different among campus users, with the most significant difference again between students and staff. This study also tested the function of general wildlife values to predict species-specific value orientations, in this case, Canada geese. Findings

showed the general wildlife value orientations predicted 68% of variance between the two variables, with domination being a better predictor at 65% than mutualism.

Chapter 3 relied on increasing conflict scenarios: 1) a pair of geese hiss at humans, 2) a pair of geese charge at humans, and 3) a pair of geese attack humans to predict acceptance of killing the nesting pair or the entire family. The Canada geese value orientation was a better predictor of acceptance of lethal management than the general wildlife value orientation. The Potential for Conflict Index₂ also confirmed there would be less consensus as the management options became more extreme. Students and faculty demonstrated significant differences for killing geese in scenarios 1 and 2, however, the last scenario saw the most significant difference between staff and students.

In conclusion, this thesis adds to the body of knowledge in the field of human dimensions of wildlife by a) identifying general wildlife and Canada geese specific value orientation differences in a university population with differing age, gender, and education levels, b) validated the use of general wildlife value orientations to predict species specific (Canada geese) value orientations, c) demonstrated the predictive quality of species specific value orientations on the acceptability of lethal management, and d) provided another example using the Potential for Conflict₂ Index to visualize acceptance of lethal management options among groups.

4.2 Recommendations for Future Research

1. This research was conducted during lockdowns associated with Covid-19. This may have affected peoples' perceptions of geese as they were not in daily contact with them (Osterman et al., 2023), as they would be during a regular school year. Numerous students' responses

indicated they had never attended classes on campus which may have also influenced their views and attitudes about Canada Geese on campus (Ardoin et al., 2015). This research, or a similar study should be repeated once the university is back to regular operations. This may provide a clearer understanding of campus users' views in a more typical setting.

2. This research focused solely on students, staff and faculty although the campus is used for a variety of reasons by other members of the public. Expanding this research instrument to gain a better understanding of the general public's values and attitudes about Canada geese on campus will provide a whole picture of all campus users' values, attitudes about Canada geese.

3. Knowledge levels have been associated with people's acceptance of wildlife (Ardoin et al., 2015; Kim et al., 2018). In this research, public education was the most preferred management method in human-geese conflict scenarios of this research, however, the distinction wasn't made between educating the public about lethal management, or about how to avoid conflicts, so respondents were left to interpret this option according to their own bias. Further research into campus users' knowledge level of Canada geese, how to identify potential conflicts, management options and what education messages can help minimize negative human-geese scenarios should be considered.

4. The University of Manitoba is a multi-cultural campus with an international student community comprising 22.7% of registrants (University of Manitoba, 2024). Exploring cultural values and attitudes toward Canada geese and campus wildlife in general could determine if wildlife value orientations are different between users of different countries of origin (Jacobs et al., 2022). In turn, it is important to develop a deeper understanding of the campus community demographics by identifying potential areas of conflict or consensus, which is a critical part of public outreach and gaining support for management and conservation approaches.

4.3 Considerations for Decision Makers and Campus Wildlife Managers

The Southwood Circle expansion is currently underway for a portion of the campus to the north. Preliminary designs indicate an extensive water feature lined with greenery that connects to riparian habitat along the Red River (UM Properties, 2024). Although aesthetically pleasing to humans, waterbodies are known attractants to Canada geese (Smith, 2006), as well as predators such as red fox and possibly even coyotes that may use the nearby riverbank as a travel corridor (Frankowiak et al., 2019). Eliminating the water feature would reduce this major attractant for geese, though it may not be feasible due to storm water management requirements. As an alternative, planting shrubs and small trees surrounding the water feature, as well as placing obstacles such as boulders at the shoreline will make this feature less attractive to geese (Conover, 1985). Groundcover selection will also contribute to the attractiveness of the University campus. Canada geese have a foraging preference for turfgrass species such as Kentucky bluegrass, creeping bentgrass and fine fescues (Washburn and Seamans, 2012), converting areas with high human traffic to less palatable species or naturalizing areas with taller grass species will make areas of campus less appealing to foraging geese (Conover, 1992).

This study identified public education as the preferred management option in human-geese conflicts. The Goose Education and Awareness Committee on campus is tasked with providing information about the campus geese population and reporting geese related issues. Though a campus wildlife plan webpage exists to describe the University's approach to responding to geese on campus, there is little information readily available on the main page for campus users to immediately access regarding avoiding conflicts with geese (University of Manitoba, 2019). Instead, users scroll to the bottom of the page where they are encouraged to review a number of

links to media stories to learn how to avoid conflicts with geese. Developing a “Dos and Don’ts” section, and placing it more prominently on the webpage would facilitate access to information. Improving educational signage in areas with a potential for high conflict between geese and humans could increase awareness and reduce negative interactions (Choquette, 2021, Donnelly et al., 2021). Additionally, tailored public education about specific management options for different Canada geese management objectives should be developed and implemented across campus. These messages should be distributed across social media, campus radio and possibly even through pop-up kiosks. Understanding the level of knowledge and targeting gaps in campus users’ understanding of wildlife management will facilitate a socio-ecological approach that considers both humans’ and geese interests (Liordos et al. 2017)

4.4 Chapter 4 Bibliography

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Appendices

Ethics Approval



University
of Manitoba

Research Ethics and Compliance

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PROTOCOL APPROVAL

To: Fran Mulhall (Advisor: Michael Campbell)
Principal Investigator

From: Andrea Sz wajcer, Chair
Research Ethics Board 2 (REB 2)

Re: Protocol # R2-2021:022 (HS24725)
Values and Attitudes Toward Canada geese and Population
Management on the University of Manitoba Campus

Effective: April 9, 2021

Expiry: April 9, 2022

Research Ethics Board 2 (REB 2) has reviewed and approved the above research.

REB 2 is constituted and operates in accordance with the current [Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans – TCPS 2 \(2018\)](#).

This approval is subject to the following conditions:

- i. Approval is granted for the research and purposes described in this application only.
- ii. Any changes to this research must be approved by the Human Ethics Office (HEO) before implementation.
- iii. Any deviations to the research or adverse events must be reported to the HEO immediately.
- iv. This approval is valid for one year only. A Renewal Request Form must be submitted and approved prior to the above expiry date.
- v. A Study Closure Form must be submitted to the HEO when the research is complete prior to the above expiry date, or if the research is terminated.
- vi. The University of Manitoba (UM) may request to audit your research documentation to confirm compliance with this approved protocol, and with the UM [Ethics of Research Involving Humans](#) policies and procedures.

Funded Protocols: Email a copy of this Protocol Approval, with the corresponding UM Project Number, to ResearchGrants@umanitoba.ca

Research Instrument

Values and Attitudes Toward Canada Geese and Population Management on the University of Manitoba, Fort Garry Campus.

Greetings,

My name is Fran Mulhall and I am a Graduate Student in the Department of Environment and Geography being advised by Dr. Michael Campbell.

I would like to invite you to participate in a study I am conducting toward my Master of Environment thesis on the topic: Values and Attitudes Toward Canada Geese and Population Management on the University of Manitoba, Fort Garry Campus. In this study, campus users including faculty, staff and students are invited to take part in an online questionnaire that aims to better understand how campus users feel about Canada geese on campus and different population management options. Your views are important and may inform policy decisions about wildlife management on campus.

The survey is estimated to take you approximately 20 minutes to complete and can be navigated using a laptop, tablet or smart phone. You do not have to provide any personal, identifying information to participate. Responses will be kept confidential, and no registration is required. Data will be analyzed as part of my Master's thesis and published in academic journal

articles as well as shared with the University of Manitoba Sustainability Office and the Vice-Provost office.

Your participation is completely voluntary. You can withdraw from this survey at any time or skip any questions you do not wish to answer, however, any responses will not be able to be withdrawn once submitted. All data is kept confidentially (you will not be asked for your name or any other identifying information) and I will not be able to withdraw your data once it has been submitted.

Additional information is available at the beginning of the online questionnaire. This study has been reviewed and approved by the Research Ethics Board at the University of Manitoba, Fort Garry campus. If you have any questions about this study, please contact Fran Mulhall (principal investigator) by email at [REDACTED].

Thank you for your time.

Sincerely,

Fran Mulhall, Department of Environment and Geography University of Manitoba

If you wish to proceed and consent to participate in this survey, the link below will take you to a webpage where the questionnaire is located and hosted by Survey Monkey:

<https://www.surveymonkey.com/r/DFGN5KX>

RESEARCH INSTRUMENT

Part 1. Your views about wildlife in general.

Please read each statement and indicate if you strongly disagree, somewhat disagree, neither disagree nor agree, somewhat agree, or strongly agree.

1. Humans should manage wild animals for humans' benefit.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

2. It is acceptable for humans to cause the loss of individual animals so long as the population as a whole is not threatened.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

3. Hunting is cruel and inhumane.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

4. Hunting for food is acceptable.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

5. Wild animals should have the same rights as humans.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

6. Wild animals may have some rights, but humans' rights are more important.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

7. Humans should not treat wild animals in a way to cause pain or suffering, no matter how much we benefit.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

8. I enjoy watching wildlife whenever I can.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

9. I enjoy seeing wildlife on campus.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

10. I'm interested in making the areas on campus attractive to wildlife.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

11. We should learn all we can about wildlife.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

12. I enjoy learning about wildlife.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

13. We should ensure wildlife exists for future generations.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

14. I like knowing wildlife exists on campus, whether I see it or not.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

15. All wildlife has a right to exist.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

Part 2. Your general views about Canada geese.

Please read each statement and indicate if you strongly disagree, somewhat disagree, neither disagree nor agree, somewhat agree, or strongly agree.

1. It is acceptable for humans to cause the loss of an individual Canada goose, so long as the population as a whole is not threatened.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

2. Humans should manage Canada geese populations for humans' benefit.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

3. Hunting Canada geese is cruel and inhumane.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

4. Hunting Canada geese for food is acceptable.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

5. Canada geese should have the same rights as humans.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

6. Canada geese may have some rights, but humans' rights are more important.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

7. Humans should not treat Canada geese in a way to cause pain or suffering, no matter how much we may benefit.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

8. I enjoy watching Canada geese whenever I can.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

9. We should learn all we can about Canada geese.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

10. I enjoy learning about Canada geese.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

11. We should ensure Canada geese exist for future generations.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

12. Canada geese have a right to exist.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

Part 3. Your specific views about Canada geese on the University of Manitoba campus.

Please read each statement and indicate if you strongly disagree, somewhat disagree, neither disagree nor agree, somewhat agree, or strongly agree.

1. I enjoy seeing Canada geese on campus.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

2. I'm interested in making the areas on campus attractive to Canada geese.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

3. I like knowing Canada geese exist on campus, whether I see them or not.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

4. I enjoy watching goslings (baby geese) on campus but not adult Canada geese.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

5. The number of Canada geese on campus is increasing.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

6. I've seen Canada geese attack someone on campus.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

7. I accept that when Canada geese and their goslings (baby geese) are on campus, some areas may be off-limits to me.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

8. I don't mind that Canada geese and their goslings (baby geese) can damage grass or leave droppings on campus.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

9. Canada geese can sometimes get in my way and make me wait.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

10. How many adult Canada geese do you think are on campus in August of each year? _____

11. Canada geese scare me because (choose one option):

- They carry disease They are violent I don't have them where I come from They are so big
- I don't know why, they just do Not applicable, I'm not afraid of them

12. I would like to see the number of geese on campus:

- Increase Remain the same Decrease I don't know

Part 4. Attitudes about management options to reduce conflicts between Canada geese and humans on campus.

Please read each statement and indicate if you strongly disagree, somewhat disagree, neither disagree nor agree, somewhat agree, or strongly agree.

1. Using different landscaping like boulders and bushes to make areas used by humans less attractive to Canada geese will be effective to reduce conflicts between Canada geese and humans.

- Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

2. Incorporating different grass species that are less attractive to Canada geese will be effective to reduce conflicts between Canada geese and humans.

- Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

3. Using signage to inform humans to stay away from some areas of campus used by Canada geese will be effective to reduce conflicts between Canada geese and humans.

- Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

4. Using trained dogs in a controlled setting to scare Canada geese away from areas used by humans will be effective to reduce conflicts between Canada geese and humans.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

5. Covering well-known nesting sites in areas used by humans with some material to prevent nesting and encourage Canada geese to nest elsewhere will be effective to reduce conflicts between Canada geese and humans.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

6. Rounding up Canada geese and relocate them to other lands like nearby fields or Wildlife Management Areas will be effective to reduce conflicts between Canada geese and humans.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

7. Adling (shaking) eggs in the nest to prevent them from hatching will be effective to reduce conflicts between Canada geese and humans.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

8. Using an oral contraceptive that Canada geese would consume as they forage that would prevent eggs from hatching will be effective to reduce conflicts between Canada geese and humans.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

9. Using an oral contraceptive that Canada geese would consume as they forage that would prevent eggs from hatching will be effective to reduce conflicts between Canada geese and humans.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

10. Focusing on public education about Canada geese will be effective to reduce conflicts between Canada geese and humans.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

11. Contributing \$5 for a campus "wildlife management fund" to ensure sustainable Canada goose populations on campus will be effective to reduce conflicts between Canada geese and humans.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

12. Have you seen any signs on campus advising of Canada geese in the area?

Yes No I don't know

13. How many injuries do you believe have occurred to campus users caused by Canada geese attacks in the past five (5) years? _____

14. In the past five (5) years, do you believe Canada goose attacks on campus users have:

Decreased significantly Decreased Remained the same Increased Increased significantly

Part 5. Support for management options to reduce conflicts between Canada geese and humans on campus.

Please read each statement and indicate if you strongly disagree, somewhat disagree, neither disagree nor agree, somewhat agree or strongly agree.

1. I would support the University using landscaping such as boulders and bushes to make areas used by humans less attractive to Canada geese.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

2. I would support the University incorporating different grass species that are less attractive to geese in areas used by humans.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

3. I would support the University using signage to inform humans to stay away from some areas of campus used by Canada geese.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

4. I would support the University using trained dogs in a controlled setting to scare Canada geese away from areas used by humans.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

5. I would support the University covering well-known nesting sites in areas used by humans with some material to prevent nesting and encourage Canada geese to nest elsewhere.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

6. I would support the University rounding up Canada geese and relocate them to other lands like nearby fields or Wildlife Management Areas.

Strongly disagree Somewhat disagree Neither disagree nor agree Somewhat agree Strongly agree

7. I would support the University adling (shaking) eggs in the nest to prevent them from hatching.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

8. I would support the University using an oral contraceptive that Canada geese would consume as they forage that would prevent eggs from hatching.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

9. I would support the University implementing a Canada goose cull (killing some geese) to reduce the overall population on campus.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

10. I would support the University focusing on public education about Canada geese.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

11. I would support contributing \$5 for a campus “wildlife management fund” to ensure a sustainable Canada goose population on campus.

Strongly agree Somewhat agree Neither disagree not agree Somewhat agree Strongly agree

Part 6. Attitudes about management options in specific Canada goose/ human interaction scenarios on campus.

Please read each statement and indicate if you strongly disagree, somewhat disagree, neither disagree nor agree, somewhat agree, strongly agree.

1. A pair of Canada geese (nesting pair) builds a nest in a high traffic area. How do you feel about the following approaches:

| | | | | | |
|--|-----------------------|-----------------------|-----------------------------------|--------------------|--------------------|
| | Stron gly disagree | Somew hat disagree | Neith er disagree nor agree | Somew hat agree | Stron gly agree |
|--|-----------------------|-----------------------|-----------------------------------|--------------------|--------------------|

| | | | | | |
|---|--|--|--|--|--|
| Do nothing | | | | | |
| Relocate that nesting pair | | | | | |
| Remove (kill) that nesting pair | | | | | |
| Relocate the entire family (adults and eggs/goslings) | | | | | |
| Use a contraceptive program to reduce the overall campus population | | | | | |
| Increase public education | | | | | |

2. A pair of Canada geese near a nest with eggs show aggression by hissing and opening wings (in a threat display) to challenge humans in a highly used area. How do you feel about the following approaches:

| | Strongly disagree | Somewhat disagree | Neither disagree nor agree | Somewhat agree | Strongly agree |
|---|-------------------|-------------------|----------------------------|----------------|----------------|
| Do nothing | | | | | |
| Relocate that nesting pair | | | | | |
| Remove (kill) that nesting pair | | | | | |
| Relocate the entire family (adults and eggs/goslings) | | | | | |
| Use a contraceptive program to reduce the overall campus population | | | | | |

| | | | | | |
|---------------------------|--|--|--|--|--|
| Increase public education | | | | | |
|---------------------------|--|--|--|--|--|

3. A pair of Canada geese charge humans who got too close to their nest in a highly used area. How do you feel about the following approaches:

| | Strongly disagree | Somewhat disagree | Neither disagree nor agree | Somewhat agree | Strongly agree |
|---|-------------------|-------------------|----------------------------|----------------|----------------|
| Do nothing | | | | | |
| Relocate that nesting pair | | | | | |
| Remove (kill) that nesting pair | | | | | |
| Relocate the entire family (adults and eggs/goslings) | | | | | |
| Use a contraceptive program to reduce the overall campus population | | | | | |
| Increase public education | | | | | |

4. A pair of Canada geese attack humans in a highly used area. How do you feel about the following approaches:

| | Strongly disagree | Somewhat disagree | Neither disagree nor agree | Somewhat agree | Strongly agree |
|----------------------------|-------------------|-------------------|----------------------------|----------------|----------------|
| Do nothing | | | | | |
| Relocate that nesting pair | | | | | |

| | | | | | |
|---|--|--|--|--|--|
| Remove (kill) that nesting pair | | | | | |
| Relocate the entire family (adults and eggs/goslings) | | | | | |
| Use a contraceptive program to reduce the overall campus population | | | | | |
| Increase public education | | | | | |

5. A family group of Canada geese are eating grass and damaging lawns, making it difficult to maintain areas used by humans. How do you feel about the following approaches:

| | Strongly disagree | Somewhat disagree | Neither disagree nor agree | Somewhat agree | Strongly agree |
|---|-------------------|-------------------|----------------------------|----------------|----------------|
| Do nothing | | | | | |
| Relocate that nesting pair | | | | | |
| Remove (kill) that nesting pair | | | | | |
| Relocate the entire family (adults and eggs/goslings) | | | | | |
| Use a contraceptive program to reduce the overall campus population | | | | | |
| Increase public education | | | | | |

6. A family group of Canada geese have left droppings on sidewalks and grassy areas, negatively affecting how humans use the area. How do you feel about the following approaches:

| | Strongly disagree | Somewhat disagree | Neither disagree nor agree | Somewhat agree | Strongly agree |
|---|-------------------|-------------------|----------------------------|----------------|----------------|
| Do nothing | | | | | |
| Relocate that nesting pair | | | | | |
| Remove (kill) that nesting pair | | | | | |
| Relocate the entire family (adults and eggs/goslings) | | | | | |
| Use a contraceptive program to reduce the overall campus population | | | | | |
| Increase public education | | | | | |

7. A family pair of Canada geese have blocked the sidewalk or stopped traffic, affecting how humans use the campus. How do you feel about the following approaches:

| | Strongly disagree | Somewhat disagree | Neither disagree nor agree | Somewhat agree | Strongly agree |
|------------------------------------|-------------------|-------------------|----------------------------|----------------|----------------|
| Do nothing | | | | | |
| Relocate that nesting pair | | | | | |
| Remove (kill) that nesting pair | | | | | |
| Relocate the entire family (adults | | | | | |

| | | | | | |
|--|--|--|--|--|--|
| and eggs/ goslings) | | | | | |
| Use a contraceptive program to reduce the overall campus population | | | | | |
| Increase public education | | | | | |

Part 7. A little bit about you

The following information helps to better understand the participants in this questionnaire.

1. Please indicate if you are:

Student Staff Faculty

2. What faculty are you in? Please write N/A if you are staff and not affiliated with any faculty.

3. How many years have you spent studying/ working at the University of Manitoba Fort Garry campus?

4. Please describe the setting you grew up in:

- a small town with a population of less than 1000 people
- a medium sized town with a population between 1001-10,000 people
- a town with a population of 10,001- 100,000
- a small city with a population of 100,001-300,000
- a city with a population of 300,001 or more

5. Have you spent at least one summer semester on campus (working or studying)?

Yes No

6. How do you normally access the University of Manitoba campus?

- Bicycle personal vehicle/ carpool Public transit Walk

7. What is your gender identity?

- Female Male Non-Binary Prefer not to say Other identity not listed

8. How old are you? _____

9. Have you ever been charged by a goose?

- Yes No I don't know

10. How often are you physically on campus during a normal year?

| | Zero | Once a week | Two to three days | Four to five days | Everyday including weekends |
|-----------------------------------|------|----------------|----------------------|----------------------|-----------------------------------|
| Mid- March to Mid- April | | | | | |
| Mid- April to Mid- June | | | | | |
| Mid- June to Mid- August | | | | | |
| Mid- August to Mid- October | | | | | |