

Traces of Being:
People and Coyotes
in Urban and Suburban Canada

by

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Master of Design, 2014

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Abstract

My thesis examines how human/coyote interactions in urban and suburban Canada are representative of larger issues surrounding our relationship to nature and non-humans. I have created a series of drawings and laser-cut coyote bodies that respond to a set of limited cultural perceptions of coyotes through observing, exploring, and engaging those perceptions. My work is informed by the collection of data from online surveys, interviews, participatory and observational research, and photographs from wildlife cameras. These pieces represent multiple perspectives of coyotes based on community responses and biological studies.

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Dedication

To my mum and dad,
who thought going back to school at any age was always a good idea.

Mary Gazetas
1943 - 2012

Aristides Gazetas
1930 - 2013

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Preface

As a child, I was sure I was going to be a naturalist and spend my adult days studying wildlife and plants. Although I studied biology at the undergraduate level in the early 1990s, I did not follow it as a career, remaining an amateur and keeping my fascination with wildlife as a hobby. For years my weekly planners sprouted illustrations of birds, dogs, lemurs, seals, lions and tapirs, depending on what I have recently seen on TV, in a book or at a museum. Eventually I began to absorb biological trivia and botanical information on my travels, buying field guides to local flora and fauna, keeping sketchbooks of birds sighted and edibles gathered. When my collection of acorn recipes started to equal the number of my CSS reference books, it made me wonder if I was still in the right field of work as a web developer and designer. One of my goals for undertaking my thesis work was to understand what would happen if my love of biology was integrated into my design and art practice. My thesis work explores my initial investigations into what my role could be as a designer and a communicator working within design, art, ecology and biology disciplines.

Chapter One: Introduction

The premise has been that human civilization should not encroach into the natural world, nor should the natural world move too far into human territories.

— Alexander Wilson

Studying the western city as a specific human habitat is important since it is such an influential ideological machine, shaping habitat and habitus globally.

— Anabelle Sabloff

Canadians are living in cities in increasing numbers, from 70% of the total national population in 1970 to 81% in 2011 (Statistics Canada). The growth of Canadian cities into rural or undeveloped areas has eroded existing wildlife habitat (Donnan 2). As that habitat is enveloped, rail and hydro corridors link new suburban landscapes to existing urban centres, supporting wildlife movement along those corridors. The unintentional wildlife corridors created by rail and hydro lines are now connecting to more urban green space than before, as urban planners add to existing parks. Green spaces in cities have been found to mitigate and reduce storm runoff, aid in heat reduction during the summer, and are buffers for noise and air pollution (McPherson, 42). Because of these changes in our urban and suburban landscapes, we have more opportunities than ever to see a multitude of wildlife in backyards and parks, from squirrels and raccoons to geese, coyotes and white-tailed deer.

Coyotes are one example of urban wildlife that seems to be increasingly common. This is reflected in Canadian newspapers; in a media content analysis from 1995 to 2010, there were 453 distinct news stories in Canadian print media about human-coyote encoun-

ters in urban areas. None were found dated from before 1998 (Alexander and Quinn 346).

Seeing a coyote walking down an urban street has been perceived by some as a threat to public safety. On February 11th 2013, a coyote was seen walking down the street in Cabagetown, a neighbourhood of Toronto. Local residents called the police to report seeing the coyote. When police arrived, they surrounded the coyote on a side street. The police then determined that the coyote was behaving in an aggressive manner and resolved what they perceived to be a problem by shooting and killing it (Ballingall).

What is happening in neighbourhoods across Canada? Are coyotes relatively new residents in our cities or have we simply not noticed them before? More problematic, or perhaps more revealing, is the “highly charged discourse” described by Alexander and Quinn which surfaces after negative encounters between coyotes and people are reported in the news (346). This discourse reveals real fears and emotions regarding the safety of pets and children. It shows there is a gap between the perceived risk of seeing a coyote and the actual risk of coyotes living alongside of us, with the perceived risk being higher than the actual risk (357). In addition, the primal emotional reaction evoked by encounters with coyotes is an indicator of something else. Our responses encapsulate and reflect our understanding of what our relationship is to other non-humans that share our cities with us.

The specific human/coyote relationship invokes our beliefs about ourselves and nature in general. To help me gain awareness and a better understanding of some of these shared beliefs, I look to ecological and post-humanist philosophers along with biologists in my literature review. In observing relationships that exist between Canadians and coyotes

in urban and suburban population centres, I seek to gain insights into our behaviour and reactions. From my observations and theoretical investigations, I've sought to learn applicable methods of working with a community organization on sensitive topics, to explore how my skills as a designer can be used in creating and deploying research methodologies and to create visual pieces based on my research.

Research Questions

How can my creative process respond to limited cultural perceptions of coyotes to encourage different perspectives? I have developed a response that is observational, exploratory, engaging and challenging. My thesis research looks at human/coyote interactions within the Greater Toronto Area and surrounding municipalities as a specific case study. It examines what perceptions exist and what those perceptions are based on, whether it's cultural, historical or scientific.

My main research question is guided by two related sets of inquiries. These are comprised of questions I seek to address through my literature review and questions I have approached in my studio practice. The broad approach supports my observational strategy in gathering a wide range of data and information about coyotes.

My theoretical investigations seek to understand why there have been historically negative outcomes between humans and coyotes in Western culture. My data collection methods examine community-based knowledge on coyotes, educational efforts by wildlife organizations and the documentation of coyotes with remote wildlife cameras.

1. Why have traditional responses in Western culture to the presence of coyotes been to hunt and trap them?
2. What are contemporary ecological and post-humanist theories saying about our relationship to coyotes and other non-humans?
3. How are people talking about coyotes in urban and suburban Canada and what do they know?
4. When we are not physically present in an environment, how does that change what we observe? How do cameras change our relationship to coyotes?
5. How do wildlife groups work with the public to educate and inform them about coyotes? Can my creative process compliment those efforts?

Questions arising from my studio practice focus on the use of remote cameras, drawing methods, basic electronics and code.

1. How does a technical understanding of remote sensors, wildlife cameras and code help me to understand how to collect data about animals?
2. How do we use technology to mediate the relationship between humans and non-humans?
3. What do maps look like if they are drawn from a non-human perspective?
4. What does a coyote map of Toronto look like? What does that tell us about coyote habitats and coyote ecology?
5. Are there ways of combining ethnographic and geographic data to show a multi-

tude of human and non-human perceptions about a city?

6. How does the use of drawing as a method influence the experience of data?
7. Is it possible to carry theoretical concepts such as the animal Other into my drawings to encourage different ways of viewing coyotes?

Both sets of questions inform my approach to my main research question and are documented in my research and creation chapters.

Theoretical Framework

My theoretical investigations are based on several theories from post-humanist and ecological philosophies as well as research methods adopted from existing design frameworks. A design framework, such as IDEO's Human-Centered Design toolkit, is a system with "overlapping spaces" for researching, iterating and implementing responses to a specific issue or opportunity (IDEO, "About IDEO").

Using theory and research methods from these sources serves two purposes: the philosophical informs my perspective of non-humans that I use in my studio work and the design frameworks give me the observational tools to hear some of the conversations around human/coyote interactions happening in a specific community. I've adopted the term "non-human" as it is used by Cary Wolfe, Donna Haraway and other philosophers throughout my thesis to consciously avoid speaking about coyotes as animal-objects.

I look to Alexander Wilson, Wolfe and Neil Evernden for their ideas on why non-humans have been historically viewed as animal objects. I refer to Evernden, Annabelle

Sabloff and several contemporary biologists to see how categorization has limited our ability to describe what a coyote is and does, not only in terms of use-value but also as a species name.

Understanding how non-humans function as an Other for humans has taken me to ideas from Sabloff, Haraway and John Berger. Part of the appeal of the Other in my work is to render coyotes viewing us as their Other, using the gaze to subvert the relationship between us. What is watched, watches us back. This theme reoccurs in several of my works, such as *Watching* and *Six Frames*.

The use of wildlife cameras in my work is connected to ideas on how we control and conceptualize our environments through technology, as described by Alexander Wilson and Scott MacDonald. Although nature documentaries are created to carry objective perspectives, the amount of editing and scripting that underlies each production shows their innate subjective bias (MacDonald 5).

Methodology

I have adopted an interdisciplinary set of methods for collecting data through interviews, observations and surveys. The collected data is then interpreted through drawings which seek to embody my perspectives on theoretical concepts of non-humans as subjects. I've organized these methods into three different groupings for my design, ethnographic and art research:

1. *Design Methods*

I am using a combination of ecologically informed and participatory design approaches. In my final thesis pieces, I am using basic data collection methods to provide me with content for maps and illustrations.

2. *Ethnographic Methods*

I have created two online surveys, using a mix of closed and open questions. I use these surveys as a tool for data collection for content in my final drawings and maps. I use drawing as a method of documenting research, course notes and idea development.

3. *Art Methods*

Through my illustration work and an investigation of traditional methods of drawing, I explore how to represent non-humans in new perspectives. I use practice-based research to refine my approaches. I've incorporated a hand-made aesthetic in visualizing data from my research, to make it more personable and approachable. To learn from other artists and visual creatives who work within a similar style, I've selected three case studies; the interactive NFB project *Bear 71*, Sam Easterson's *Burrow-Cams* and Laurie Frick's *Sleep Patterns*. The first two exemplify a visual language that has potential for reframing how we conceptualize non-humans, while the third shows how patterns in data can be rendered by hand in illustration and sculpture. Both of these approaches are fundamental components of my final thesis work.

Throughout my thesis research, I have been developing an interdisciplinary process with the intent to apply this process to other future case studies. The workflow starts with and is informed by research from community, scientists and theorists, then based on responses to my research tools is manifested through drawing and map-making into my final thesis pieces. Each of these stages is documented in the following chapters.

Chapter 2: Literature Review

Neil Evernden, Annabelle Sabloff and Alexander Wilson speak of key moments and themes which explain why a Western relationship with non-humans has had dysfunctional aspects. Wilson states that “The roots of Western science lie in Greek natural philosophy and Pauline Christianity, which conceived of nature, in the broadest sense, as the corrupter of a transcendent human soul.” In Wilson’s writing, this perspective frames nature and non-humans as separate from humans and that it is our right to use nature as a resource (Wilson 121, Sabloff 78). Because of this perspective, animals in this world were defined as objects rather than subjects, seen as machines that function with “no awareness or initiative” (Evernden 77). Seeing an animal as a machine prevents any empathy or identification with them. These writers and theorists point to the historical dysfunction of traditional Western perspectives with non-humans but they also write about how this perspective is changing.

Since the late 20th century, a groundswell is reframing our understanding of non-humans as well as ourselves. Alexander Wilson wrote in 1991 that the barrier between ourselves and animals is “permeable, moveable, shifting, able occasionally to be leaped over” (155). A decade later, Cary Wolfe wrote in his introduction to *Zoontologies* that the primary perspective of self is changing through the rise of the “question of the animal” in contemporary Western culture (x). There is increased inquiry from art and design “in post-humanist, non-anthropocentric approaches toward exploring the multiple roles and meanings of animals in human lifeworlds” (Pedersen and Snæbjörnsdóttir 109). Wilson refers to

a blurring of human and non-human boundaries that I've sought to incorporate into my studio practice either by representing coyotes as subjects instead of objects, or through using technology as a bridge for communicating between humans and non-humans.

Wolfe also describes a "boom" in cognitive ethology and field ecology that deconstruct identifiable human traits such as tool use, language and cultural knowledge (xi). Cognitive ethology is the study of the evolution of non-human consciousness and behaviour (Bekoff 1). The emergence in environmental biology of ideas and research about non-human behaviour suggests that animals have needs and social structures of their own, something a machine-like interpretation of animals does not support (Evernden 78).

A slow break down of the space between human and non-human over the last twenty years in Western humanities has created a new awareness of ethics for treating animals as subjects, not objects (Wolfe xi, Evernden 77). Looking at human-coyote interactions through the theoretical lens of post-humanism and especially through the writings of Wolfe, I see much potential for learning from both coyotes and human residents from "a 'rhizomatic' network of thinking." (Wolfe xix). This mode of thinking values perspectives from all sides of a community, and is one of the reasons why I polled residents using my online survey, to understand the range of opinions existing and to use those opinions as a qualitative source in my work.

Categorization

Our knowledge of things is defined by how we categorize them and how many cat-

egories we have in total. A category such as “dog” or “cookie” is a distinct and unique object, separate from all other objects that surround us. The more granular our categories, the more ‘subtle’ our understandings can be of how named items function in our world (Evernden 75).

Based on the many comments posted to online news articles about coyote sightings in Canada, coyotes appear to be both loved and hated (Ballingall). This polarity is problematic in and of itself, as it provides little room for a more nuanced understanding of what these creatures are. In 1992, Donna Haraway describes a need for a new approach to the natural world that isn’t defined by binary categories. In her essay *The Promises of Monsters*, she states that “We must find another relationship to nature beside reification and possession” (64). The reification that Haraway speaks of is especially pertinent to human interactions with coyotes in cities and towns as it is the opposite of a traditional Western perspective of coyotes as vermin. It shows a desire for communion that perhaps explains why some people feed coyotes.

During my on-site visits in 2013 with Coyote Watch Canada, we visited residents in St. Catharines and Niagara Falls. I saw several instances where coyotes had either been fed directly by people or had become accustomed to other anthropogenic food sources like pet food that had been left outside (source).

Similar to Haraway’s thoughts on the reification of animals, Sabloff names the attraction to and desire for communion with non-humans as biophilia. She speaks of this as an identifying trait among humanity for over 400,000 years (54). A creative interven-

tion could encourage other ways for people to gain a feeling of kinship with coyotes besides feeding them. The phrase 'A fed coyote is a dead coyote' demonstrates the negative outcome that occurs when coyotes get used to handouts from people. Coyotes desensitized to being around people hunt small pets and become aggressively bold. (Fox; Coyote Watch Canada)

Naming them vermin creates a bias that demands to be fulfilled through hunting and trapping (Steeves 245). Viewing coyotes as a "component of production" and a source of income is possible when they are seen as animal-objects (Wilson 127; Haraway 21). An example of this can be seen by the combination of animal-object and vermin concepts to justify the use of coyote pelts as parka trim on Canada Goose's website (Canada Goose Inc). In seeing them as vermin or seeing them as an opportunity for communion with nature, these interpretations result in death for the coyote.

Categorization occurs with scientific classifications such as family, genus and species. These categories place different types of living creatures into ordered, distinct groupings; a human-made system created to organize nature. Species names contain human bias and values from our historical relationships to animals and how useful they are to us (Steeves 251; Sabloff 258).

However no species classification is a fixed point as a taxonomy of species is always changing. A species is defined as a group of organisms that can only reproduce with other members of their own species, but hybrids can occur between some species (Caldwell, Collins, and et al). Within the *Canis* family on the North American continent, there are wolves (*Canis lupus*), coyotes (*Canis latrans*) and domestic dogs (*Canis familiaris*). There are 19

sub-species of coyote across North America, adapted to their own unique ranges (Fox and Papouchis 5). Genetic studies of wolves in Algonquin Provincial Park have shown inter-breeding between grey wolves, eastern wolves and eastern coyotes (Patterson et al. 5934). Coyotes themselves show us that species categorization is not capable at defining exactly who they are.

A final category that can be misleading is the category of predators. One aspect of our cultural misinformation that is “entrenched” is our belief that predators have an “unquenchable hunger.” Any decline in numbers for a prey species is attributed to their predators. Any increase must be because predator numbers have dropped (Evernden 108). This belief may erroneously inform hunters that their role as humans in an ecosystem is to keep the population of nuisance predators such as coyotes in check.

Coyote Biology

The concepts of ecosystems and roles within an ecosystem was generated by biologists (Wilson 146). In order to better understand what role coyotes play in their ecosystems, I looked to contemporary voices from biologists describing coyotes in published research papers.

Coyotes evolved on the North American continent and have been here for almost 10,00 years, with minimal changes to their physiology. They have had a long time to refine their survival skills and to learn how to live besides people (Alexander 2). Coyotes are medium-sized predatory mammals that weigh between 20 to 50 lbs. They are omnivores

and share similar feeding habits with wolves and foxes. Along with domesticated dogs, wolves, foxes and coyotes are members of the Canid family. They can form large groups to hunt white-tailed deer, or remain as solitary hunters to catch rodents and other small mammals. (Fox, Papouchis 10). They will eat a surprising amount of fruit; coyote scats reveal a taste for crabapples in Alberta and winter persimmons in Virginia (Lukasik 46; Gammons 47). A coyote functions as a keystone predator when they are the largest predator present in an ecosystem (Fox, Papouchis 8; Lukasik 33). Keystone species influence their ecosystems more than any other species, often in a disproportionate ratio to their numbers. (“Keystone species”).

Recently published studies of coyotes show that their presence in Canadian urban and suburban landscapes aids in pest control and in maintaining a diversity of songbirds and plant life. Coyotes control other small carnivores (such as raccoons, cats and foxes) that prey upon songbirds (Crooks and Soulé 3). By feeding on rats and other rodents, coyotes indirectly help vegetation from being overgrazed and encourage plant diversity (Henke and Bryant 14). Coyotes like goose eggs and will cache them to eat later. In a 2007 study by biologist Justin Brown, coyotes were responsible for 75-78% of all goose nest predation (5). Although many of these studies were conducted in North American cities outside of Ontario, because of the widespread range of coyotes these results show the flexibility and value of the role of coyotes in our ecosystems.

Knowing about some of the biology and ecology behind coyotes can help shift an object-based perspective to a subject-based one in two ways. Learning that coyotes live in

family groups to raise their pups provides us with an awareness of how our social structures are reflected in their behaviour. Understanding what benefits coyotes can bring to urban ecologies is part of learning more “subtle” categories for them (Evernden 75).

Wildlife as Other

When we look at coyotes, using Haraway’s questions of the animal, what are we and who are we looking at? The gaze of human to non-human is a gaze from ourselves to another form of life that can be seen as the Other. John Berger in *About Looking* defines the other as those who “do not control the established institutions that define reality by those who do.” Berger states that animals are always the observed in relation to people, regardless of the fact that animals can look at us in return (16).

Annabelle Sabloff describes the acknowledgement of a returned gaze from a much earlier writer, Henry David Thoreau. “Man must realize that the gaze does not belong to him alone: nature looks back.” In his writings about nature and wildlife, Thoreau recognizes every being that he observes also has the ability to see him (175).

We can partially understand and connect but can’t “presume to completely know” the complexities of nature. There will always be something unexplainable or unknowable within the Otherness of animals. (Sabloff 158). Understanding that coyotes in their Otherness present aspects of their being which cannot be categorized or known is one goal of my illustrative interpretations of coyotes. The Other indicates a refusal to be categorized, a space for unknowing to exist.

Case Studies from Artists & Designers

The case studies that I have selected reflect two different visual and theoretical approaches. The first two examples, Sam Easterson's *Burrow-Cams* and Leanne Allison and Jeremy Mendes' *Bear 71* from the National Film Board both use video and still photographs from wildlife cameras as content for interactive and video artworks. These works visually support the concept of non-humans as subjects with their own territories and individuality.

Easterson uses small infrared cameras placed inside animal burrows and films the reactions of the inhabitants as they attempt to discern what the camera is and if it is a threat. He explains the value of these filmed encounters as defined by the absence of humans (Easterson, "Seeing Through the Eyes of An Armadillo"). The scenes from Easterson's cameras are unscripted encounters, as opposed to the heavily scripted and edited "drug and tag" wildlife documentaries created by Disney and other producers (Wilson 118).

In *Bear 71*, ten years of photos and video selected from wildlife cameras in Banff are used to build a fictional narrative told from a mother bear's perspective. The web-based interactive project is built from real data from a radio-collared bear and starts with footage of her being trapped, fitted with a collar and then released. Through an audio voice over, *Bear 71* narrates her story, describing how she tries to keep her cubs safe as she raises them beside highways, railways and many human visitors and residents. The interactive narrative allows the viewer to see multiple perspectives of other animals that live in the same area by clicking on their tags as they wander across a digital landscape. *Bear 71* is success-

ful in giving a single animal a human voice and showing us what her concerns are as she teaches her cubs how to live in an environment where the biggest concern is people. Each of these two projects feels like a hidden glimpse is being revealed to us, a glimpse of an animal Other we would normally never see in spaces we didn't know to look.

The anthropomorphism of *Bear 71* works as an intervention in providing a breach in the barrier between humans and non-humans. Through this breach, we can empathize and connect with the mother bear. A similar method can be seen in the film *Never Cry Wolf*, where an intimacy based on anthropomorphism is fostered between wolf and human (Wilson 155).

In addition to these two image-based projects, I've selected another case study that shares a similar approach to my art, the drawings of recorded data created by Laurie Frick. Frick uses data from her daily life, turning them into drawings and laser-cut paper wall hangings. What is appealing in her work is the human touch. The data comes from her and is rendered by her into something which doesn't need a computer screen to be viewed. It is manifest in the physical world. The removal of the digital screen as a mediator for content is an aspect that I want to incorporate into my own works as I feel it makes for a more engaging and approachable experience.

Frick's drawings are ethereal and gorgeous; they invite close inspection. Although her work is based on data she has collected on herself, a similar approach could be used for other types of data. Her work inspires me to use my drawing skills to see what happens when I translate the data I've collected from my research onto paper.

These three case studies form a nexus where I situate my final pieces for my gallery show, a combination of drawing, mapping and photos of coyotes from wildlife cameras. I look to the disembodied eye of the wildlife cameras as a best solution to removing the human body from the human gaze, to allow for the least possible mitigation that I can create to record coyotes. I use drawing as my way of re-interpreting the photograph, to emphasize what I consider to be important and to de-emphasize what remains.

Connections

It is time for social scientists and humanists generally to correct the widespread failure to address habitat and non-utilitarian inter-species relations in human culture and society.

— Annabelle Sabloff

To move past categories which are excessively dualistic in defining coyotes, a relationship between ourselves and non-humans can identify our roles in a more fluid fashion, making space for change and continuous redefinition (Steeves 235). Latour speaks of a world which is ‘real, collective, and discursive all together, and one cannot separate these aspects out into categories’ (8). This is also supported by Wilson’s statement that the main concept of ecology has changed how biologists view humans and our environment. Living beings are interrelated and connected to other beings and non-living elements (131).

Sabloff speaks of the necessity of being a shape shifter in post-humanist times.

A shape shifter doesn’t relate to others as a human to an object, but as a being to another being, able to use different ways of communicating according to who is there (181).

By understanding our environments as interconnected spaces, it becomes possible

to consider that one reason why coyotes are in our Canadian cities and towns is because of our own behaviour. Wolf eradication in North America allowed coyotes to move into wolf territories. In hunting coyotes unceasingly, we have pressured their social structures to be flexible enough to respond to that predation, an evolutionary trait that may have already existed in response to competing with grey wolves (Fox & Papouchis 8). It has been documented that coyote populations increase when they are hunted (Gese and Bekhoff 83). The fact that we have coyotes living in our cities and towns may be because of how we have shaped the landscape in North America as settlers.

I am specifically inquiring into what possible Western sources there might be for explaining a negative relationship between people and coyotes. This does not include an analysis of other North American perspectives and stories about coyotes, such as First Nations mythologies. Although an analysis and review of First Nations coyote mythologies was not possible in the scope of my thesis, acknowledging the importance of Coyote as a figure in the North American landscape is. First Nation stories and myths may be a possible resource for building new languages of relating to non-humans for Western culture.

Chapter 3: Early Work and Reoccurring Themes

Several of my class projects during my master's program contain themes of non-human subjectivity, inter-species communication and explorations of hand-made treatments of digital data. These are themes that I return to in my final thesis work. The following are four of these projects: *Watching*, the *Sturgeon Maps*, the *Hypothetical Telepathic Cat Vest* and the *Human-Cephalopod Acknowledgement Jacket*.



Illustration I *Watching*

Watching

In one of my first studio classes at OCADU, I created a series of coyote faces in laser cut plywood and acrylic. I was interested in representing urban wildlife that looked back at

the viewer, not in a threatening manner but in a way that acknowledged being watched. The coyote faces were a test of basic electronic circuits as well as a material study of different substrates that could be shaped by a laser cutter.

There's a reflective layer at the back of the eye of some animals called the *tapetum lucidum*. When light reaches it, some light is reflected back. Different species can be partially identified by the colour of that reflected light (Seabrook). I used reflective materials, light bulbs and mirrors to experiment with creating my own versions of reflective and emitted light in the eyes of the coyotes.

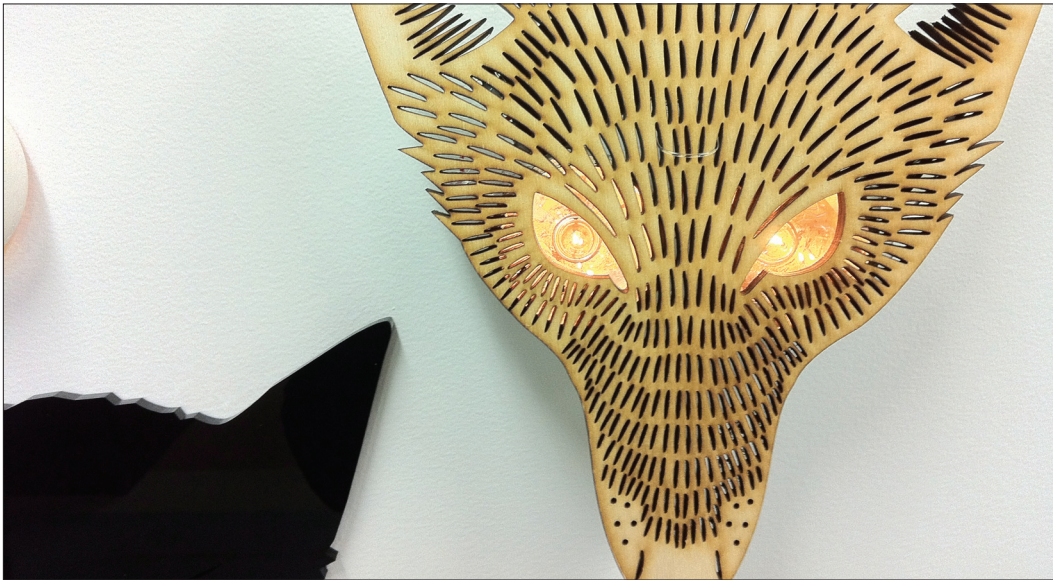


Illustration 2 Detail of *Watching*

This project contained several themes I explore later on in my thesis work. It represents the coyotes as non-humans that are capable of looking back as independent entities, not objects. It explores different techniques of digitally creating work through computer-aided tools and it focuses on urban coyotes. These themes ended up being significant in my

final thesis explorations, as covered in Chapter 5 of my research and creation.

The Sturgeon Maps

The *Sturgeon Maps* are two 24" x 30" encaustic panels that portray river maps and tracking data for the Fraser River white sturgeon in British Columbia.



Illustration 3 *Lower Fraser River Sturgeon Info Map*

The *Lower Fraser River Sturgeon Info Map (LFRSIM)* shows the Fraser River from a sturgeon's perspective. Important areas for burrowing, feeding, and overwintering are indicated on the map, and the landforms are not labeled with human cities or streets. I distorted the outlines of the river from a regular human version of the map in order to give more space to areas that were known for winter habitats. My intentional distortion of

geospatial scale in this map is to indicate increased or decreased significance of particular areas to sturgeon. As a hypothetical experiment, the map shows a river city for fish with different areas being used for different reasons much like in our own cities. This sturgeon city exists alongside the human cities of BC's Lower Mainland. Both maps are based on data from a paper published by BCIT students that worked on tagging 101 sturgeons and tracking them between November 2009 and January 2010 (Neufeld et al 13).



Illustration 4 *Fraser River White Sturgeon* The second map is titled *Fraser River White Sturgeon (FRWS)*.

For *FRWS*, I created an inset map above a large illustration of a sturgeon. The map indicates where the acoustic sensors that are used in tracking fish are located along the Lower Fraser River. Also indicated are two of the overwintering locations discovered

through tracking the sturgeons, locations that had not been known before.

These pieces are focused on map-making, not on further charts or graphs. I was intrigued by previous experiments on another assignment using QGIS (the open-source mapping application) and my difficulties with rendering shape files. The mistakes I made looked more interesting than the maps that worked. This encouraged me to introduce a more human element to my work, using visual errors and hand-drawn elements as an aesthetic. Part of this project also relates to how statistics and data can support bias, and how maps can reinforce those biases. By choosing to work with maps, I explored how to have a create a map for a non-human population. I used brush strokes and hatch marks to mimic mottled, engraved map surfaces on the *LFRSIM*, as I was inspired by the engravings and drawn quality of early maps in my research.



Illustration 5 Detail of *Fraser River White Sturgeon*

These two pieces sit between illustration and mapping. They use a visual language derived from each, the softness of the wax with maps carved into the surface and facts about the sturgeon alongside. The combination of encaustic and data visualization, specifically mapping, was an interesting combination of media. Encaustic is warm but low-reso-

lution. It can take cleaner, digital forms and soften them. This could make it more appealing or engaging to an audience, but at the same time, it could also make it less real, less factual.

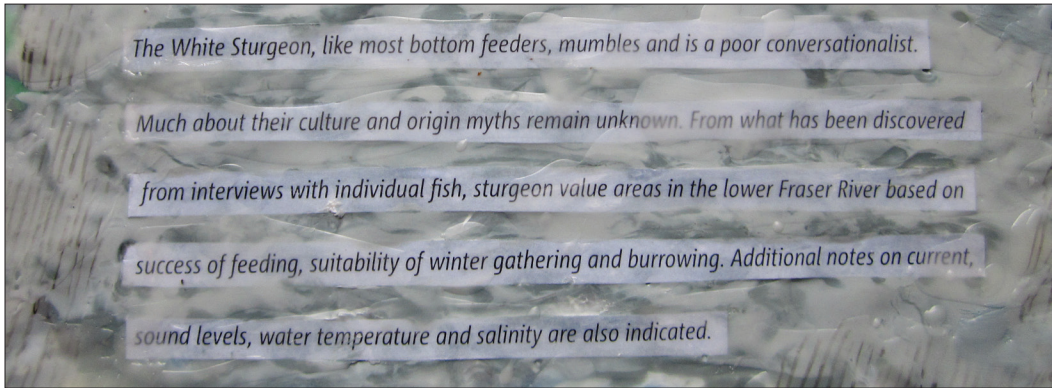


Illustration 6 Detail of *Lower Fraser River Sturgeon Info Map*

Primarily my intent is to show these as an educational tool, something that could be used to engage people and encourage conservation of habitat. My first map relies on a little magic realism to engage a viewer (the line “Sturgeons, like most bottom feeders, mumble and are known for being poor conversationalists.”), but since the map itself is a hypothetical fiction based on a few facts, perhaps my potential audience would overlook a more blatantly untrue statement. This relates to the use of anthropomorphism as a method to dissolve the barrier between humans and non-humans described by Alexander Wilson (155).

Hypothetical Telepathic Cat Vest

The *Hypothetical Telepathic Cat Vest* is a combination of two different inspirations; the design of readable low-resolution digital typefaces for LED matrices and the concept of wearable technology for animals. Part of this project is to explore how technology defines

ourselves in relation to non-human animals. Does it help or hinder our interactions?

Since cats seem to be more aloof and difficult to read than dogs, I felt that having some help in mediating human-cat communications would be interesting to other people. Other research questions that arose were to see if it was possible to associate patterns of movement to cat emotions and desires in a meaningful way. How best can this information be displayed?

It was the patient and friendly nature of a friend's cat named Bullseye that made this project possible. She is a young cat and appreciates belly rubs, something most cats that I had met didn't like. The vest can only speak in human words and movements of the cat are assigned meanings based on human interpretation. It seeks to connect and provide information on Bullseye's moods and thoughts. Much like the human voice-over in *Bear 71*, in the end, the cat vest is only capable of reflecting our understanding of non-human psychology back at us.



Illustration 7 Bullseye wearing the *Hypothetical Telepathic Cat Vest*

An accelerometer was used to track her motion with each phrase connected to a different range of motion on the Y axis of the accelerometer. Slow movements triggered

phrases relating to resting, fast movements trigger phrases related to excitement and hunger. Two LED matrices are chained together to display four phrases in total: “Feed More”, “Bird Yum!”, “Oooo Mice” and “Stop Fool”. Constructed out of an orange cotton/polyester fabric, the vest has a detachable zippered pouch containing all of the electronics and power supply.

The first fabric version was built from an old t-shirt and ended up looking like a tube sock. I switched to a more rugged outdoor fabric and built the vest from two layers that were hemmed together, then turned inside out and top-stitched to look tidy.



Illustration 8 Neck strap fitting for the *Hypothetical Telepathic Cat Vest*

The orange fabric diffused the light from red LEDs nicely, and even with the addition of a thin layer of cotton to line the zippered pouch, showed through without losing much definition. The LED matrices are very bulky to work with. Future versions of this pet vest could use thinner screens. Maybe the vest would suit dogs rather than cats, certainly it would be interesting to see a whole pack of dogs wearing their own vests at the dog park.

This project contains two reoccurring themes in my work; a desire for communication with other non-humans and use of technology to mitigate our relationship with

animals. The use of technology to moderate our relationship with non-humans is repeated with my exploration of wildlife cameras for my final thesis pieces. I look at this again in the *Human-Cephalopod Acknowledgement Jacket* and return to a study of tracking technologies in the next chapter.

Human-Cephalopod Acknowledgement Jacket



Illustration 9 Details of *Human-Cephalopod Acknowledgement Jacket*

The *Human-Cephalopod Acknowledgement Jacket* is another electronics prototype that also uses a type of motion sensor. In this prototype, a tilt sensor activates a single LED when the wearer is in motion. The interactive response alerts people of movement from one place to another and to say hello to other squids or octopi. This is based on the behaviour of the blue-ringed octopus, an Australian cephalopod that is very poisonous but apparently also tasty (Telis). As the blue-ringed octopus moves through the ocean, it flashes bioluminescent light to warn potential predators where it is. The *Jacket* is based on the

concept of using light to alert others to your presence. It also seems suitable for introverted users worried about people getting into their personal space.

For the modularity of the coat and for ease of testing, I designed a squid pocket to hold the microcontroller and a battery. I sewed snaps on the back for power, ground and other pins. I planned the circuit so that additional LEDs could be added in parallel, up to 5 in total. I found that a gentle rocking motion of my hand was better for completing the circuit with the tilt sensor, but having it on my shoulder didn't create enough movement to close the circuit. I moved the sensor to my elbow, so that I could bend and raise my arm.

Both the *Cat Vest* and *Jacket* investigate possibilities for communication between humans and non-humans species. The *Vest* uses human readable text, while the *Jacket* uses light. Each project is also an exploration of two different types of motion sensors, an accelerometer for the *Cat Vest* and a tilt sensor for the *Jacket*. Chapter Four continues my investigations into motion sensors to determine the feasibility of using them further in my thesis [work](#). I look at basic data collection from an ultrasonic motion sensor and a more complex tracking project that uses GPS tracking technology in open source lion collars.

Chapter 4: Wildlife Tracking Technologies and Cameras

I am interested in any technology that records video, images and movement data either from an animal's habitat or from sensors attached to animals. There are hermeneutical issues involving how non-humans outfitted with cameras without their consent document their own realities, a topic investigated by Donna Haraway in the "CritterCams" chapter of *When Species Meet*. As a starting point in understanding non-human perspectives, information coming from close to an animal's viewpoint seems to be better than no information at all.

When I started my master's in 2011, I was very inspired by the open-source lion collars built by GROUND Lab in 2009. Developed by Benedetta Piantella and Justin Downs, these collars used open-source technology for tracking lions on a wildlife preserve in Kenya. The collars sent mobile text messages to Maasai herdsman when the lions got too close to their cattle, giving the herdsman time to move their livestock to avoid predation. The project was an effective, inexpensive and modular solution for use in conservation biology, exemplifying some of the hallmarks of open-source hardware and software. In 2010, Piantella and Downs presented their research process to the Wildlife Conservation Society in New York City, making a case for replacing expensive proprietary tracking technologies with open source tools.

Because of the success of their lion-collar project, I was inspired to explore and research how other kinds of animal tracking technologies were being used by biologists. I wanted to approach this for two reasons, first to see if there were opportunities for using

collected data from those studies to educate and inspire the general public. My skills as a communication designer could aid in moderating between the public and the science community, finding visual solutions for representing data and giving people a chance to feel more engaged with and informed about environmental issues.

In addition, maybe there was an opportunity to find existing open source tools that could be adopted by Canadian biologists who were using proprietary technology. From Piantella and Down's research, proprietary tracking technologies seemed to be a lot more expensive and less customizable than open-source tracking solutions. Investigating these topics for my research, would afford me opportunities to connect with people studying non-humans and allow me to learn more about open-source technology.

Online Survey for Wildlife Tracking Tools

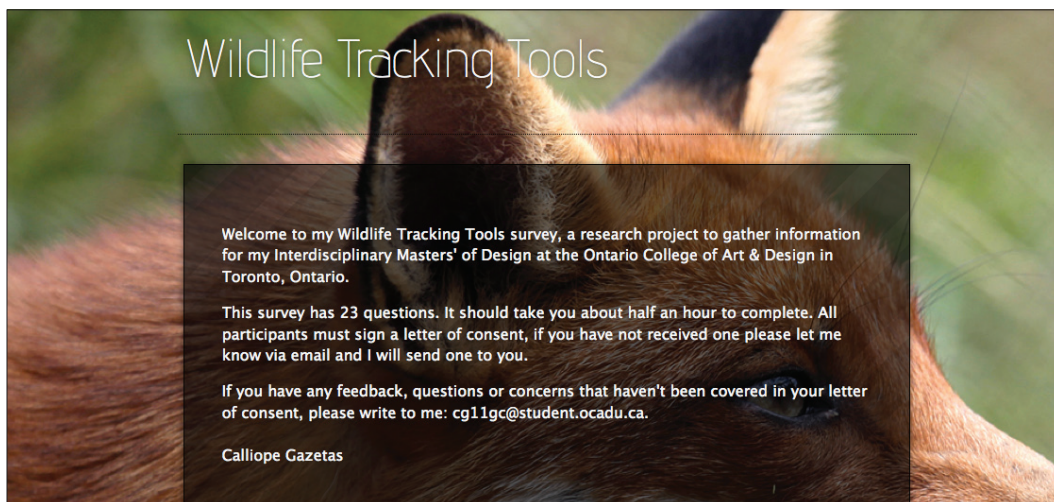


Illustration 10 Screen shot of *Wildlife Tracking Tools* Survey

I created an online survey titled *Wildlife Tracking Tools* specifically for conservation

biologists (Appendix A). The purpose of the survey was to poll biologists to determine what was being used in the field and to see if there was an opportunity for open source solutions to take the place of proprietary ones. I also was interested in the roles that biologists had in their teams, who was responsible for collecting data, who was in charge of analyzing it, and what tools they used for that. This was to see if there were roles that I could take on as a data visualization specialist. One of my thesis goals overall was to see how a designer could work with scientists. I also created questions to determine future application of tracking data that was collected. This was to identify opportunities for data to be used to reach audiences outside of the traditional peer-reviewed scientific journals.

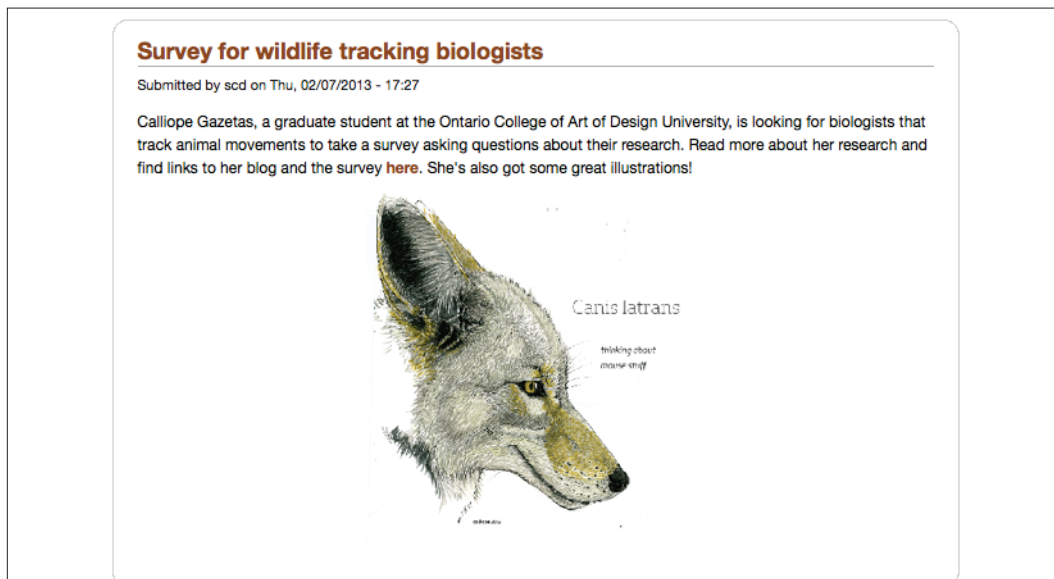


Illustration II Screen shot of *Wildlife Tracking Tools Survey* on MoveBank's homepage

I promoted my survey in part by asking MoveBank to feature it on their homepage. MoveBank is a website that provides open-source wildlife tracking data for students to use in data visualizations. They agreed to help me and my survey was featured on their home page from February 7th to February 15th, 2013. In total, my tracking technologies survey

was open from December 28th, 2012 to February 15th, 2013, about a month and a half.

Despite MoveBank's kind assistance and their large user base, I only received four complete responses out of 42 surveys that were started. Few answers were given in the optional open-ended questions that I had included. I suspected something was not working with the structure of the survey. I had to take a look at why I had such a poor return. (To view the complete responses, please refer to Appendix B.)

One issue could have been that the structure of the survey itself was too complex. I had asked respondents to send me a PDF consent form by email in addition to filling out the questionnaire. Only a few people did both, although many started the questionnaire and never finished it. I realized that I should have built the consent form into the survey so that it was easier to fill out and submit. What was interesting was that everyone who did respond liked my illustrations far more than the survey itself. I kept these findings in mind for the second survey that I launched in 2013, and made sure to incorporate the consent form into the first page of the survey.

In order to make my survey more interesting visually and to provide some ancillary reason for completing it, I created drawings of a coyote, an elk, a baby walrus and a common smoothed-nosed wombat. As participants answered questions, they would be able to see different illustrations on each of the survey pages. This ended up providing me with some interesting questions for myself about drawing as a methodology and how I could use it further with my own work. What could I achieve using illustration that was not possible for me using other methods? I return to these questions in Chapter Six where I talk about

my thesis exhibition and final pieces.

Installation of an Ultrasonic Motion Sensor

I wanted to become familiar with one type of environmental sensor so that I would have a little more fluency in understanding data collection and field setup. I worked on testing an ultrasonic motion sensor and setting up code to record data as it was collected from the sensor. All code that I used is open source and available through arduino.cc, adafruit.cc or instructables.com. I used the Maxbotix Ultrasonic Rangefinder from Adafruit. This seemed like a good place to start and a way to understand how a sensor embedded in an environment might work differently than one attached to a piece of clothing, such as in my previous projects the *Cat Vest* and *Human-Cephalopod Jacket*.

What I discovered was that a motion sensor was good at telling when something moved in front of it, but it could not tell me anything about what kind of creature was there or what that creature was doing. It was also possible that what was setting off the motion sensor was a leaf or a person.

This was invaluable experience in working with an environmental sensor, as it began to give me some kind of idea of how complex it is to set up an installation and record data which can then be turned into meaningful visualizations. Due to some of the complexities that I had encountered with this project it occurred to me that I might not have enough time in the remainder of my thesis to build my own tracking tools.

Interviews with Open Source Technology Makers

Through my research at this point, I was seeking to gain a holistic understanding of open-source tracking technologies. This included understanding the current application of tracking tools as well as finding out what development issues existed and what future applications might be possible. To help me with the latter, I created a series of interview questions for interviewing open-source hardware makers (Appendix C). I spoke to three people: Benedetta Piantella, a recent graduate of ITP who was one of the cofounders of GROUND Lab and an open source hardware researcher. Tom Igoe, an Interactive Telecommunications Program (ITP) professor at New York University who has done much work with setting up wildlife cameras looking at monkeys in Central America. In addition, I spoke to Mark Brennerman, a current ITP student at the time who was testing wearable electronics on animals at the Bronx Zoo for his thesis project.

Benedetta Piantella was my first interview. During our discussion, I realized that my questions were not uncovering opportunities for design that I could immediately work with, but instead were allowing for a deeper conversation about open source technology in general. Benedetta spoke at length about how open source tech could build community around solutions where remote participants could aid in supporting and trouble-shooting code.

After our interview concluded, I realized that there was significant ambiguity around my thesis direction in general and that my research methods were not producing relevant answers (or really, any answers) that I could work with. I had an online survey that was

beautifully illustrated but that did not provide me with significant amounts of data and a series of interview questions which were only confirming what I already knew were the benefits of open-source technologies. With these thoughts in mind for my second interview with Tom Igoe, I abandoned my previous interview questions and instead talked to him directly about my intended research and where I was at with my electronics studies. What came out of this discussion was inspiring information about wildlife camera traps and what was possible by using them. Tom suggested that I look at several wildlife camera projects online, such as Project Noah (www.projectnoah.com) The main benefit of a camera trap, as Tom Igoe mentioned to me in our phone interview, is that it can capture a large amount of information very quickly and quietly. A camera trap does not need to be attached to an animal, so the stressful aspects of live trapping and collaring can be avoided.

Tom connected me to one of his students, Mark Brennerman. Mark agreed to chat with me via Skype. We talked about how he was using mobile phones as a basis for creating waterproof, motion sensitive wildlife camera traps. Mark explained to me what some advantages are of using a mobile phone camera, such as the ability to include location data and to transmit images to external data storage devices once they have been taken. As I was looking for ways to inexpensively build or obtain wildlife cameras, Mark suggested that I contact the Smithsonian Wild (siwild.si.edu/). He knew that the Smithsonian was working on setting up a new network of 200 cameras for a project called eMammal. These cameras were to be distributed across the US, perhaps they would be interested in having a few of the cameras installed in Ontario. I emailed them to see if they would be receptive to that

idea. It turns out that their pilot project is to be centered on the mid-Atlantic region so they could test and develop their software first before deploying more cameras and they didn't have spare cameras to set up in Canada at the time (Gambino).

Despite the difficulty in finding possible wildlife cameras from other ongoing projects, I was encouraged about the benefit of using even a few cameras by reading recent news from the following groups. A recent CBC news article titled "Rare Arctic wildlife scenes caught on camera" reported that five wildlife camera traps set up by Parks Canada were returning usable scientific information on wildlife numbers, animal health and behaviour. During the summer of 2013, Pacific Wild, a wildlife organization based in British Columbia, set up several high-resolution streaming wildlife cameras in different locations along the coast of BC. By having these cameras operational, they were able to see wolf behaviour that had been theorized but never recorded. From these two projects, it appears even a small number of cameras can be beneficial in providing insights on animal behaviour. I kept this in mind in the later stages of my thesis work to use as a methodology for observing urban wildlife in and around Toronto, Ontario.

Change in Thesis Direction

I wanted to apply a solution (open-source animal tracking hardware) to a problem that was not manifesting itself through my research. I had hoped at this point something would have emerged that I could work with besides teaching myself about electronics and biology. The progress that I was making in the studio with my illustrative work seemed to

be tangential and not directly applicable.

Considering that my strengths were as a designer and that I was starting to see the limitations of my current approach (not enough time or programming experience), I was hoping to learn something from my interviews that would help me reframe my thesis work into a more achievable project.

What struck me emphatically about my investigations into animal tracking technologies were two points that were leading me away from following them further for the rest of my thesis research. I realized as I talked to biologists and looked at current tracking tools in use that there seemed to be plenty of options available. It was not likely I could improve on what was available. The other insight was that my skill set for programming was at a novice level. In order to make something open-source that might be useful, I would either need to find a collaborative partner or additional time to learn these skills.

Wildlife Camera Traps

The appeal of possibly capturing unscripted encounters such as those described by Sam Easterson with his work motivated me to figure out a basic wildlife camera installation. I first looked to build my own open-source cameras, based on the TTL Security camera that is available through Adafruit. A TTL camera kit is the same price as a pre-assembled camera through National Geographic's online store, around \$100. I favoured the advantage of not having to build a camera from scratch and purchased one from National Geographic to set up on my back fence in Toronto. The camera documented several squirrels running

along my back fence in December 2012.



Illustration 12 Squirrel Wildlife Camera Photo with Squirrel Wildlife Camera Illustration

As I was capturing images on camera, my primary advisor encouraged me to continue to explore these images through drawing and animation. I found by using illustration, a more approachable treatment was created around the colder, technical images recorded by camera. I found this an enticing aspect and decided to keep exploring the tactile and hand-drawn characteristics of filtering data through illustration. I returned to this methodology in the later months of my thesis exploration.

Project Noah

One of the camera possibilities which Tom Igoe spoke to me about was incorporating citizen science into my research tools. Crowd-sourcing photographs of wildlife is one way to gather information without incurring the expense of buying hundreds of cameras. Instead, people with smart phones or cell phone with cameras can take the photos and post them online. Project Noah is a crowd-sourced wildlife documentation project with hundreds of missions online that people can join. One such mission, Project Squirrel, was

featured in the *Nature of Things* documentary “Nuts about Squirrels”. Project Squirrel tracks the range of fox and grey squirrels in North America to understand more about each squirrel species and what types of habitat they prefer.

I contacted Project Noah to see if it was feasible for me to create a coyote mission. They put me in touch with a master’s student in Chattanooga, Tennessee who was also working on coyote coexistence research. The hope was we could co-manage a coyote mission for North America to see where people are seeing coyotes in their neighbourhoods. There were various technical and geospatial reasons why Project Coyote did not work out in time to produce usable data, but a crowd-sourced mission like this could be effective in pinpointing areas where coyotes are being seen and possibly to track if there are conflicts or issues with feeding or food being available. In addition it would be another way to educate people about coexistence policies and methodologies.

I was committed to finding a way of using wildlife cameras in my work but I was still missing a big piece of what to do next. In the next chapter, I detail how I discovered a local issue involving people and urban wildlife that supported my continued research and investigations around wildlife, cameras and community.

Chapter Five: Coyotes Among Us

A realization for me at this time was that I needed to enlist my abilities as a designer and artist instead of ignoring them. I changed my approach and retraced my steps, reading about design frameworks for research and setting up opportunities for myself to observe what was happening locally with wildlife and people. Finding a local project would help me develop my skills by working with other people and organizations. I began to keep my ears and eyes open for possible projects within the Toronto area.

Meeting Coyote Watch Canada

I follow many different wildlife and environmental advocacy groups on Twitter for personal interest and to find conversations relating to my thesis research. In September 2012, The David Suzuki Foundation tweeted about a *Living with Wildlife* conference happening in Toronto. I found out that the conference was created by the Association for the Protection of Fur-Bearing Animals (APFA) to help Canadian municipalities with increasing interactions between people and wildlife. A section of the conference lectures was about coyotes. This seemed like a great opportunity to learn more about what might be happening with coyotes and people in Toronto.

The coyote lectures formed a fascinating portion of the conference agenda as a heated discussion followed the presentations. The dialogue was about what could be attracting coyotes to particular neighbourhoods in Toronto at the time and what level of human involvement might be related to that.

The primordial, emotional reaction I saw at the *Living with Wildlife* conference sparked a question for me: What is it about coyotes and people that make this discussion such an emotional issue?

Afterwards, I introduced myself to one of the conference speakers: Lesley Sampson of Coyote Watch Canada. Coyote Watch Canada (CWC) is a wildlife advocacy organization based in Niagara Falls. After talking to Lesley and explaining my research and design perspective to her, I felt it might be possible to collaborate on the conservation work she was conducting. We made arrangements to speak further to see how my research could support some of CWC's goals.

At this time, I began to utilize my design background to frame a possible new direction for my thesis work. From what I had seen at the *Living with Wildlife* conference, an opportunity might exist around the issue of human/coyote interactions to improve outcomes for both people and coyotes. I started looking at design frameworks to give myself a better understanding of what research processes other designers use when looking at community issues.

Design Frameworks

My process for approaching a community that was concerned about coyotes in their neighbourhood was based in part from human-centered design frameworks. In *Designing for Social Change*, author Andrew Shea credits the availability of several design toolkits for helping him understand the process of creating designs for a community. One of them, the

IDEO Design Toolkit, uses Human Centered Design (HCR) as a design framework. There are three main elements to HCR: Hear, Create and Deliver. These elements are viewed through three lenses: desirability, feasibility and viability. When I looked at human-coyote interactions through these three lenses, I came up with the following sub-questions:

1. *Desirability*: What do people seek in their ideal neighbourhood, whether it's urban, suburban or rural? Is feeling secure and able to protect those dependent on them part of that?
2. *Feasibility*: What is possible to create to address peoples' concerns? How can people feel heard and empowered?
3. *Viability*: What is the lifespan of this project? Who will be contributing to it and what are the possible stages?

With the Hear component of HCR, I knew that I needed to start researching what local Torontonians and other GTA residents think about coyotes, especially in the wake of several recent media articles. The most recent news was of a coyote in Neville Park attacking and killing a small dog (Toronto Star). What I sought to bring into my research methods was the creation of a space to listen to residents and understand their concerns. It may sound ironic to use human-centered design for a project that ultimately had coyotes as the end client. I felt that a community of people who were empowered by learning about coyotes and that had their fears addressed would result in fewer coyotes being killed.

I could see that part of the issue was that there is fear and a lack of information for residents to feel empowered about living alongside coyotes. If people are living in an ideal

urban or suburban neighbourhood, living with a minimum of fear and uncertainty is a key component. For people with pets and children, there is additional concern about being able to protect their kids and animal friends. No one wants their cat to end up as a coyote snack, and I certainly didn't want a coyote to be shot because someone's cat was easier to eat for supper than a nice big rat or Canada goose egg.

By using Human Centered Design as a design framework, the idea of coexistence could be seen as promoting an environment of understanding from people towards other non-humans. If the fear and concerns of urban residents are addressed, and education is used to help people understand how coyotes live, the removal that particular fear would improve the general wellbeing of a community. The more people feel safe in their own neighbourhood, then the less likely that a coyote interaction will be negative for everyone involved.

There are other design frameworks which can be seen as HCR related, especially the following which are described in *Design Activism* by Alastair Fuad-Luke.

1. *Sustainable Design*: Design that is concerned with the triple bottom line of people, planet and profits.
2. *Codesign or User-centered Design*: Involving clients in the process of design and focusing on their needs.
3. *Empathetic design*: Researching people's stories and relating those stories to quantitative data.
4. *Experience Design*: The experience of a person is created first, then followed by the

design of items that support that experience.

Each of these frameworks encourage the designer to listen to people's experiences and ideas and seek to address their concerns. Ensuring that design decisions are sustainable means respecting that we are part of nature, not separate from it.

The key part of the IDEO framework that I integrated into my methodologies and final pieces was the Hear component. This is where I started with my second online survey and what I kept in mind as I attended site visits with CWC.

Participatory Research with Coyote Watch Canada

An initial step in understanding more about human/coyote interactions within Toronto and nearby municipalities involved visiting Lesley and her CWC volunteers in her home town of Niagara Falls.

Lesley invited me to participate in a wildlife survey on Navy Island, an island in the middle of the Niagara River, between the Canadian and US border. There had been reports of coyotes living on the island and Lesley wanted to investigate. A wildlife survey counts how many distinct species are at a particular site. Species are identified by sight, by sounds such as bird song, by tracks and by looking at scat. No one lives on Navy Island now, but it used to have lodges and farms from the 19th century. There are overgrown foundations and wild vines in the northern end, and oak forests covering the southern part of the island. We found deer beds in grasses, a little mouse in an old campground and otter scat along the river, but no sign of coyote.



Illustration 13 Photographs of Navy Island in the Niagara River

This initial meeting and field survey was a good connecting point for establishing a relationship with Lesley and CWC. During the time we walked over the island, we determined further opportunities for research and dialogue over the next year.

In March of 2013, Lesley invited me to attend a public meeting that was set up by the city of Toronto, the Beaches Coyote Coalition and Coyote Watch to address recent concerns about local coyotes. A coyote had been seen multiple times near Neville Park and the

Beaches hanging out on peoples' lawns and it had recently attacked a small dog (Slaughter).

During the meeting I was astonished to see people becoming angry and upset to the point where a local cop that was attending had to step in and remind people to stay civil. People were mad at the city for not listening to their concerns about coyotes or providing them with ways to deal with the problem. This was a very similar reaction to what occurred after the presentations at the *Living with Wildlife* conference I had attended the previous year. The apparent reason this particular coyote was becoming brazen was human food sources were being made available to it, either from being fed directly by people, or from eating unsecured garbage or pet food that was left outside (CWC). The “highly-charged discourse” referred to by Alexander & Quinn in my introduction was unfolding in front of me and I wanted to understand why.

In the summer of 2013, I attended several site visits with Lesley. During these visits I did not participate in the interviews, but sat quietly to observe her interview process and responses to residents that had contacted her with concerns about coyotes in their area. This gave me the opportunity to see first-hand what concerns people had about coyotes and what their level of knowledge was on coyotes before having a conversation with Lesley or receiving educational materials. My observations helped me understand what visual and creative approaches might support coexistence.

Other Camera Installation Attempts

I spent some time working with CWC to get a camera set up in Niagara Falls. Having a camera on privately owned land was a good first step to document coyote behaviour in a rapidly developing residential neighbourhood. During the summer of 2013, I contacted the High Park and Etobicoke Parks Supervisors to see if I could install additional cameras in public park lands. It seemed that it would be an easy way to supplement the photos that CWC was obtaining in Niagara Falls. I wanted to see if photos from park lands would differ significantly in showing what types of animals lived and moved through a protected natural space.

What I didn't expect was that the idea of setting up a camera in a public space was controversial, especially since High Park is known as a cruising destination for gay people. I was so focused on wildlife documentation that this did not occur to me. To negotiate this issue, I offered to post signage in the park saying that a wildlife camera was in a certain location so people would know that they might be documented. I also offered to sign a contract stating I would delete any photos with people in them. Neither of these offers worked out, the High Park supervisor did not want me installing cameras and despite repeat attempts to contact the Etobicoke park supervisor I was not successful. I was warned that if any cameras were found installed without proper consent from the park, the police would be paying me a visit. I left it at that. Having cameras in urban wildlife corridors could be an effective way to document how often larger mammals use those pathways, and whether other green space development would aid those populations. Investigations might have

been more successful if I contacted a city councillor and worked on it through City Hall or other municipal level contact.

People & Urban Wildlife Survey

Once I had decided to work with CWC and after I had attended some public meetings, I felt that I needed to ask Canadians about their knowledge of wildlife around them and specifically about coyotes. This would help establish a baseline of knowledge for myself and for CWC to understand where possible intervention efforts might be most useful. My second survey was titled *People & Urban Wildlife* (Appendix D). The survey was open from October 4th – 18th, 2013 and collected 59 responses, 40 of them complete. (To view the complete responses, please refer to Appendix E.) I promoted this survey through Twitter and Facebook and asked Coyote Watch Canada to feature it on their Facebook page and Twitter account as well. It was also promoted through the OCADU Graduate Office mailing list.

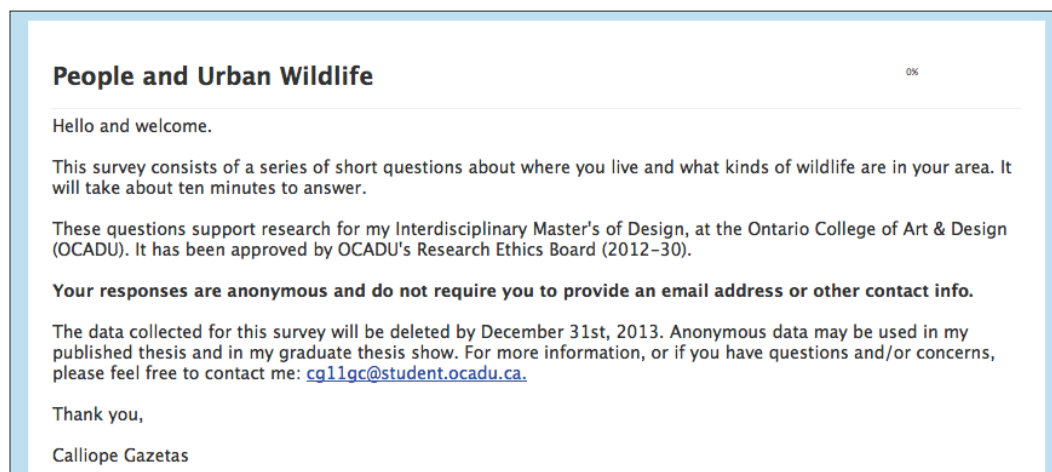


Illustration 14 Screenshot of *People and Urban Wildlife* Survey

In general, most respondents were familiar with seeing some kind of wildlife, and over half (22 out of 40) stated that either green space, urban wildlife or nature was a key component of their ideal neighbourhood.

Many of the respondents spend time outdoors, and selected several outdoor activities as their hobbies, such as hiking, cycling and gardening. Almost none of them could describe a coyote or understood the scientific name (*Canis latrans*) compared to a fox, wolf or lynx. 16 have seen a coyote in their neighbourhood; four of those said that coyotes caused a problem in their neighbourhood either on their property or involving their pets. When asked directly in another question, only 14 people said they had seen a coyote or known that a neighbour had seen a coyote. None who had issues with coyotes left pet food outside. Two people had pets that stayed outside.

Was an online survey the best research tool for such personal information? Perhaps it may have been better to interview people in person. Is there a space where it would have made sense to talk to different people about coyotes such as a pet store, park or other educational space? The difficult task would be to find a neutral place where people would be willing to offer up their opinions. A public space might be too public for expressing opinions on hunting and trapping. One benefit of an online survey is that it's private and participants can voice their opinions without worrying what the neighbours are going to think. There's a trade-off between intimacy that would encourage more storytelling, in an in-person interview, and the privacy of an online confidential.

Niagara Falls Camera Installation

Because of the effectiveness I saw in the previous camera-based projects from Chapter Four, I focused on donating a wildlife camera to Coyote Watch Canada and helping them with the installation. A couple living in Niagara Falls noticed coyote pups living behind their back yard, and contacted CWC for advice. They were taking photos of the pups and were amenable to having a wildlife camera set up in their backyard. Their neighbourhood is rapidly being developed with new suburban housing and scrubland that remains between housing developments is being cleared. This afforded the rare opportunity to see a coyote family raising their pups behind their property.

From June to November 2013, 129 photos of the coyotes and their pups were taken with the Wildview camera that I donated to CWC. The best of the series were 66 photos taken from October to November of 2013. Those 66 photos had the correct timestamp on the images. They became the basis for the *Six Frames* and *Walking Through a Field* drawings in my thesis show.

It took some time to test out the camera and get it to work in the field. One issue that arose was that the date and time needed to be reset every time the camera was turned off and then turned back on again. 63 images had incorrect dates on them. Having an SD card meant that the camera had to be opened up to retrieve the images, one of the issues that Mark Brenneman was working to address with his mobile phone cameras. Certainly if the camera had been in a more remote location, it would have been more difficult to retrieve photos from it. Having the camera on private property meant that CWC needed to check in

with the home owners and work with their schedule for coming by their house in order to respect their time and privacy.

In the summer, it was more likely that the images from the camera were captured in colour. Longer days made for less time when the camera would switch to black and white infrared mode. As winter approached, most of the photos were black and white. In the 66 photos from October - November, only one set of six photos is in colour. Depending on the behaviour of the animals being observed and the time of year, knowing that some images will not have colour information may impact future studies.

It was very satisfying to see images coming in from the camera. I worked with Lesley from CWC to set up a remote method of viewing the images through Google Drive. Although I had time for several site visits over the summer, I could not go to Niagara Falls during the fall term, which is when the camera was working at it's best. Having a remote method of accessing the images once Lesley had downloaded them from the camera made the process and installation successful.

I learned several things from the camera installation in Niagara Falls about creating a budget and securing funding to support the goals of the installation. It would have been great to have multiple cameras in different locations. Knowing who to ask in order to gain permission for the installation of cameras is key. Had I started by talking to a city councillor I may have gotten permission to set up in public parks or hydro right-of-ways. Training and support for volunteers that are managing the camera is also important, not only to show them how to use the camera, but leaving them with a manual or other resources that

they can consult. Setting up a schedule for follow-up visits to ensure everything is working and that any questions can be addressed in person would also have been a good idea, especially if it had been a bigger installation with more cameras.

The research I did for this stage of my thesis provided me with the raw data for my thesis show. It also helped me understand some basic guidelines for working with a community group and supporting a technical installation. Although the knowledge gained from community interactions is not reflected in my final work, that experience has helped me with one of my thesis goals, understanding how I can work with other people and groups and how to support their goals with research and participation.

Chapter Six: Results and Thesis Exhibition

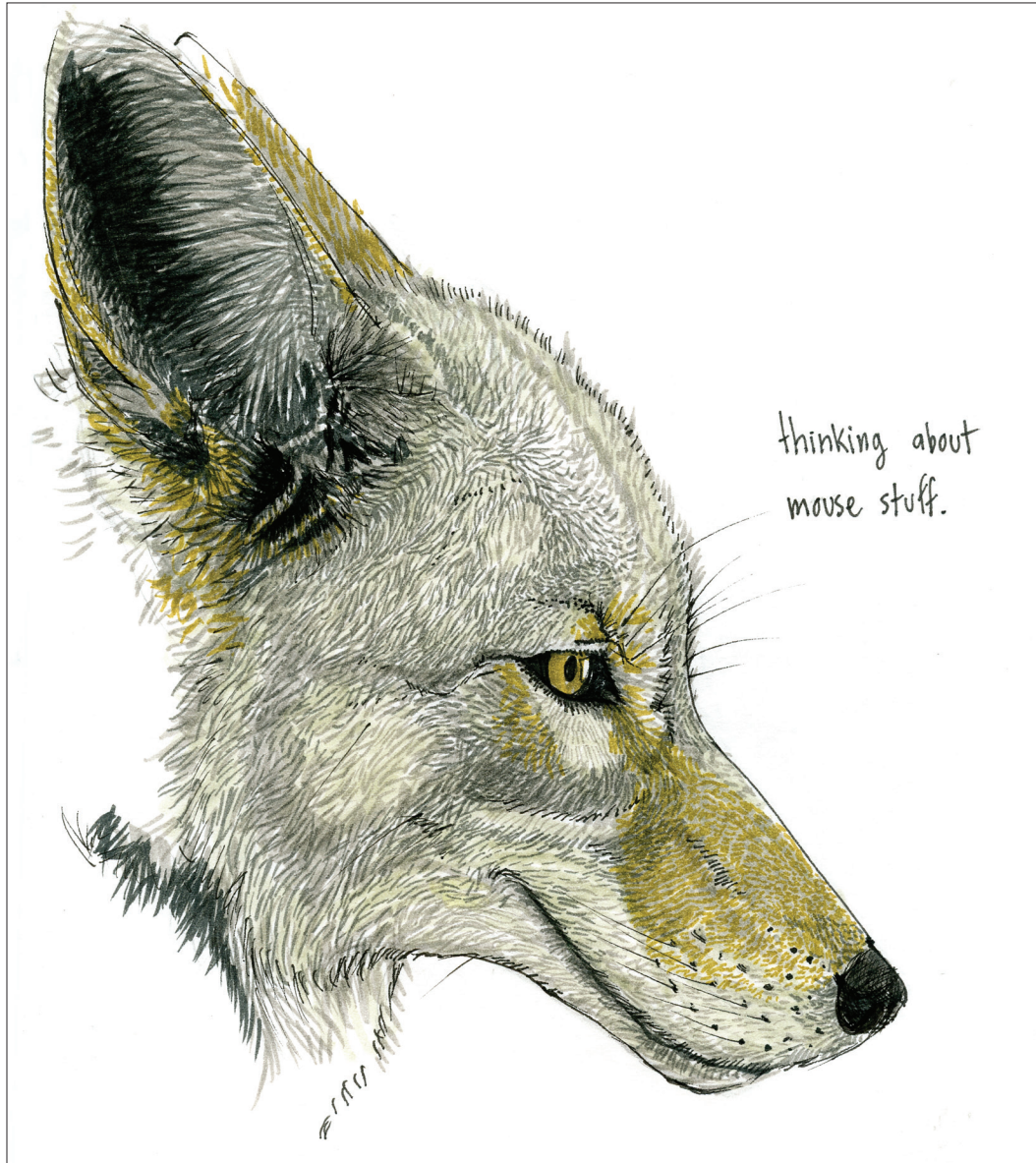


Illustration 15 *Thinking About Mouse Stuff*

Returning to a Drawing Methodology

The drawings I created for the *Wildlife Tracking Tools* survey were the start of a different approach for my thesis work. These drawings took me on a more reflective journey to

look at traditional etchings and illustrative techniques. One aspect I was exploring with my illustrations was how to create more evocative fur and hair textures using felt-tipped pens, ink and watercolour washes.

In February 2011, Google had launched the Cultural Institute Art Project, enabling the viewing of artworks from museums and art galleries around the world (Google Cultural Institute). Part of the Art Project web interface includes the ability to zoom in to each artwork to view them at high resolutions. While I was researching drawing techniques on the Art Project site, I came across scans of Albrecht Dürer's *Hare* (1502), *The Large Piece of Turf* (1503) and the *Dead Blue Roller* (1500 or 1512). By using the Art Project interface I could zoom in to see every brush stroke and line of ink on his drawings. The realism of his technique to create non-human presence seemed suitable to adapt for the drawings I wanted to create, drawings that could recognize the individuality and presence of the animals I was portraying.

Thesis Exhibition

Using drawing to interpret wildlife camera images and responses from my *People & Urban Wildlife* survey became a key visual method for my thesis show. This was manifested in the hand-drawn type for the *Coyote Conversation* laser cut coyote figures, in two large drawings based on wildlife camera images and in the maps I drew of macro and micro landscapes of Toronto and Niagara Falls.



Illustration 16 Installation of *Coyote Conversations*

Coyote Conversations

Coyote Conversations is a set of three masonite laser cut coyote figures, with three accompanying sentences. This piece uses six phrases that are descriptions of coyotes from my *People & Urban Wildlife* survey. I selected three phrases that were positive about describing coyotes and three that were negative or misinformed. These phrases illustrate the polarity of categorization described in my literature review around coyotes. The positive phrases are embedded in the bodies of the three coyotes, and the negative ones are outside, to visually illustrate the difference between the two viewpoints.

I hand-drew the type for the letting in the coyote bodies and outside and then traced the letter forms in Adobe Illustrator to turn them into vectors. This allowed them to be scaled and then cut out with a laser cutter. Having the type closely integrated with the

shape of the coyote bodies allowed me to follow lines of fur in the placement of the letters. This looked more cohesive than if I used a typeface for the lettering. I chose a script style of lettering of the negative comments outside the coyote bodies for two reasons. I wanted to separate the style of lettering between the positive and negative comments; the lettering inside the coyote bodies is a mix of hand drawn capital and lowercase letters in a sans serif style. I also wanted the outside words to be cohesive element that could be mounted directly to a wall, without having to place individual letters.



Illustration 17 Detail of *Coyote Conversations*

Coyote Conversations is a reflection of existing knowledge from people living in Canadian urban and suburban centres. It is not a scientific portrait but a collection of coyote stories and community knowledge. I want to promote awareness that there are multiple perspectives of coyotes and that what they know may be biased in one direction or another. Using a similar anthropomorphic technique to *Bear 71* and my Cat Vest project, I use human

words inscribed in the bodies of the coyotes to bridge the barrier between human and non-human.

Wildlife Camera Photos & Drawings

There was a particularly good series of photos taken from October to November 2013 on the wildlife camera in Niagara Falls. 66 photos were taken of 11 separate occasions where the motion sensor was tripped, with six photos in each set. I treated the photos in two different formats. I created a series of photo strips of four of the instances, and printed them out as black and white images on a laser printer. Each strip used a large sheet of bond paper 106" long and 24" high.



Illustration 5 Installation of *Wildlife Camera Photo Strips*

Most of the instances were black and white night photos taken with the infrared lighting system on the camera. Daytime photos were in colour, but only one of the instances in this series was taken in daylight. The black and white night time images had a mysterious, otherworldly quality to them but were very static when displayed on the gallery walls.

To work with the wildlife camera images further, I used two of series capture from the camera in large drawings to show the passage of time and the movements of coyote bodies through space. This resulted in the *Six Frames* and *Walking Across a Field* drawings.



Illustration 19 Installation of *Walking Through a Field*

In *Walking Through a Field*, I paid close attention to the background shapes of foliage and trees to emphasize the environment around the coyotes. I rendered the foliage in detail to create a solid mass of texture that the ghost-like coyote figure crosses in front of. The coyote is a white shape in part because this particular model of wildlife camera is not able to capture much detail in dusk and at night. In the source photos, the coyotes are blurred white shapes unless they stood still for several seconds. Having the coyotes drawn as transparent shapes in contrast to the detailed, texture-rich leaves behind them refers to ideas of the animal Other, an unknowable category that is capable of registering presence, but not definition.

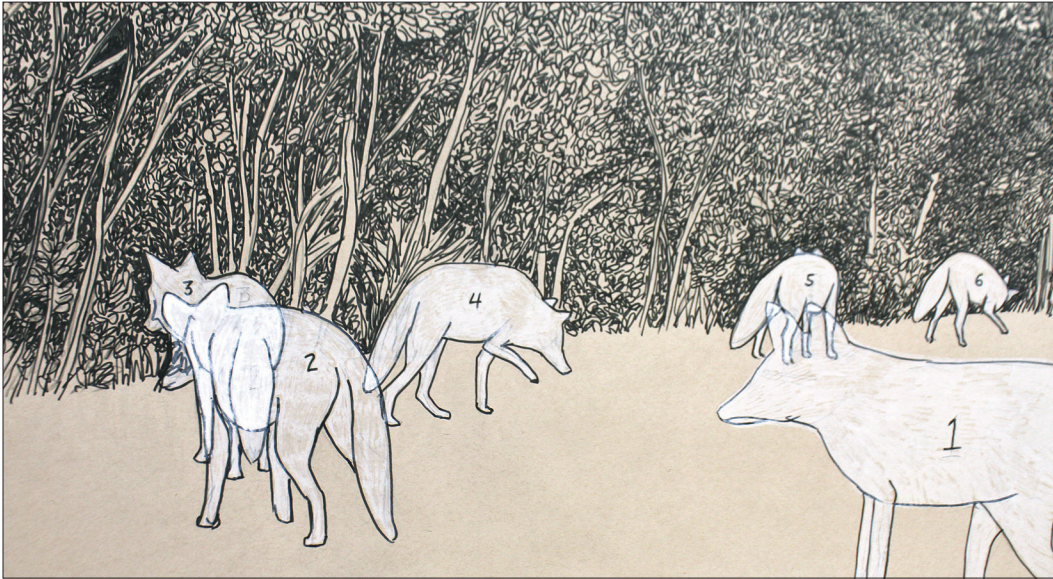


Illustration 20 Detail of *Walking Through a Field*



Illustration 21 Installation of *Six Frames*

Six Frames shows a coyote with layered tracings of the wildlife camera images on top of each other. I concentrated on the eyes and facial details of this particular animal, showing his/her face in multiple positions as he/she turns to look at different points while stand-

ing almost completely still for several seconds. This sequence was the closest that a single coyote stood to the camera. There was much detail that I could observe in the texture of the fur. I used a fine-tipped black pen to capture these details of fur and eyes. I layered the time stamp of the images as I layered the different positions of the coyote's face.

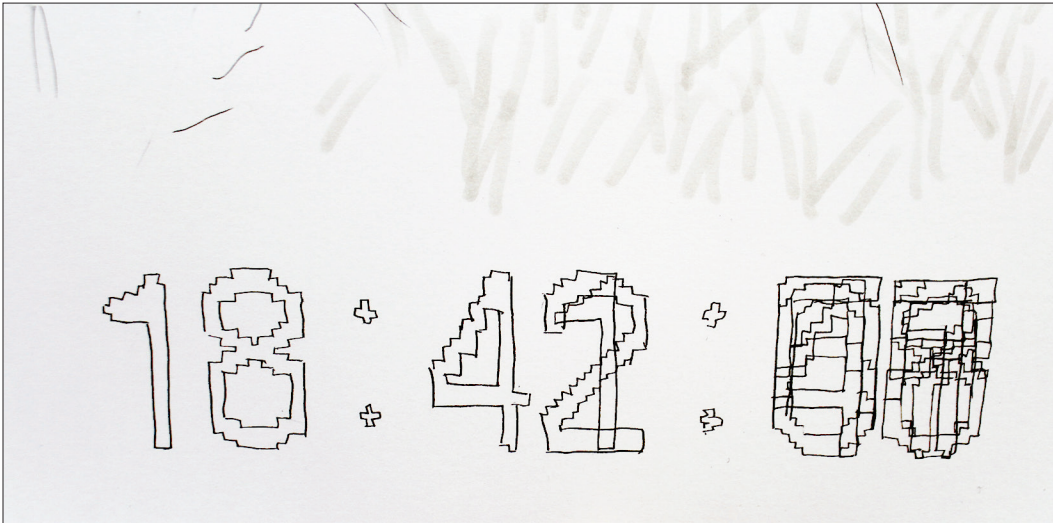


Illustration 22

Detail #1 of *Six Frames*



Illustration 23 Detail #2 of *Six Frames*

I used a projector to switch between photographs for both *Six Frames* and *Walking Across a Field*. I projected the photos onto large pieces of paper pinned to a wall. This enabled me to work at a much larger, more immersive scale than I have attempted before.



Illustration 24

Installation of *Anything Delicious*

Anything Delicious

Anything Delicious is a representation of a coyote diet that does not depend on anthropogenic food sources, showing how much fruit and vegetable sources make up what they eat. Like *Coyote Conversations*, this piece also uses hand-drawn type inside a laser cut coyote body. Words such as “mice,” “goose eggs,” “herbaceous plants” and “rats” fan out across the body in alignment with fur direction. These dietary sources are taken from coyote research papers in my literature review and are to demonstrate the variety of different foods coyotes can live on. I experimented with a different surface treatment on this piece than what I used on the *Coyote Conversations*. Here I used ink lines and watercolour washes to define the shape

of the body and provide contrast against the gallery walls.



Illustration 25 Installation of *Toronto Respondents Describe Coyotes in Their Own Words*

Toronto Respondents & Niagara Falls Micro Map

The large map of Toronto shows a hypothetical coyote perspective of connected areas, ravines and rail corridors. These are places for wildlife urban wildlife to move through the city and live, where there is green space. It repeats the idea of creating maps from a non-human perspective that I visited initially in the *Sturgeon Maps*.

I created a style of representing three different types of areas while keeping them visually related. Highways and other human-centric developments are not shown in the map. Showing different cities and their respective green spaces would be an interesting experiment in seeing how they compare. What would the city of Niagara Falls look like compared to Toronto? How would a downtown area be different from a more suburban neighbourhood?

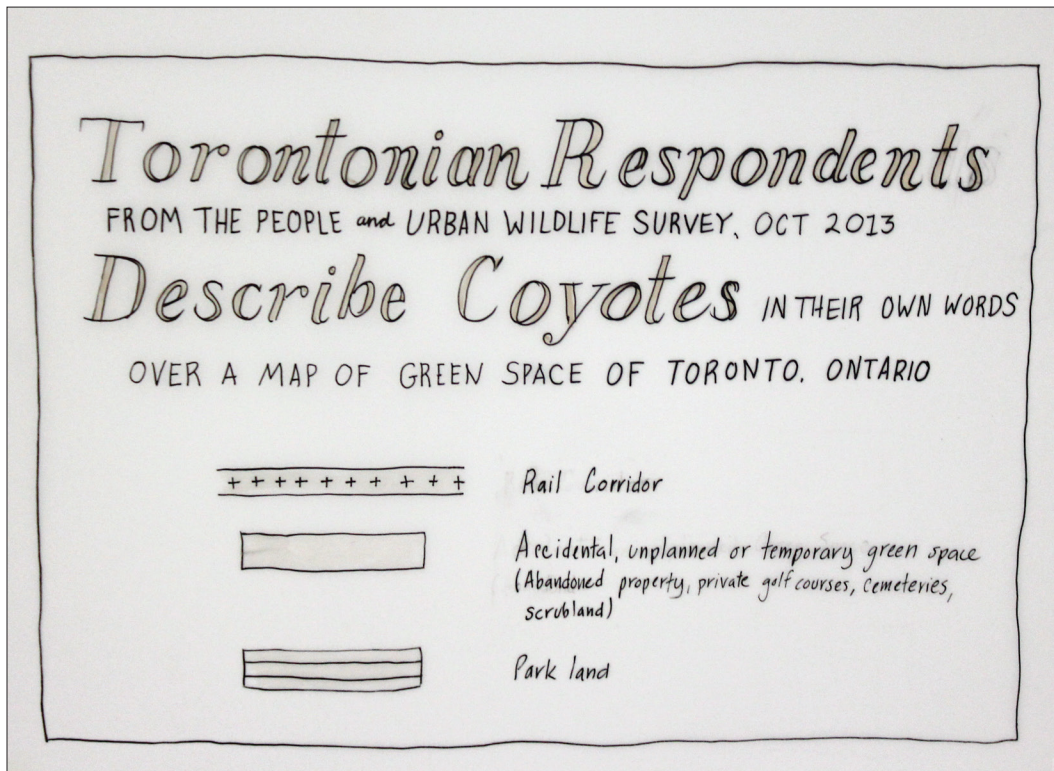


Illustration 26 Detail #1 of Toronto Respondents Describe Coyotes in Their Own Words

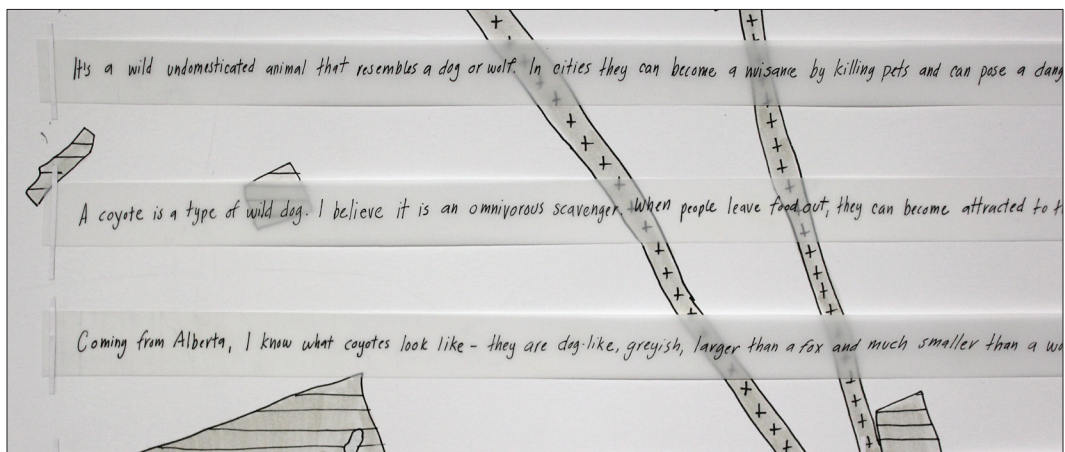


Illustration 27 Detail #2 of Toronto Respondents Describe Coyotes in Their Own Words

For the *Niagara Falls Micro Map*, I drew a bird's eye view of the surrounding houses and businesses around the wildlife camera installation. This is to show how fragmented the landscape is for this particular family of coyotes. Despite the development of suburban

housing around them, there was a golf course and camp grounds, as well as many farms just down the road. Seeing this gave me a new appreciation for coyotes' ability to live in a changing landscape while keeping their family together.

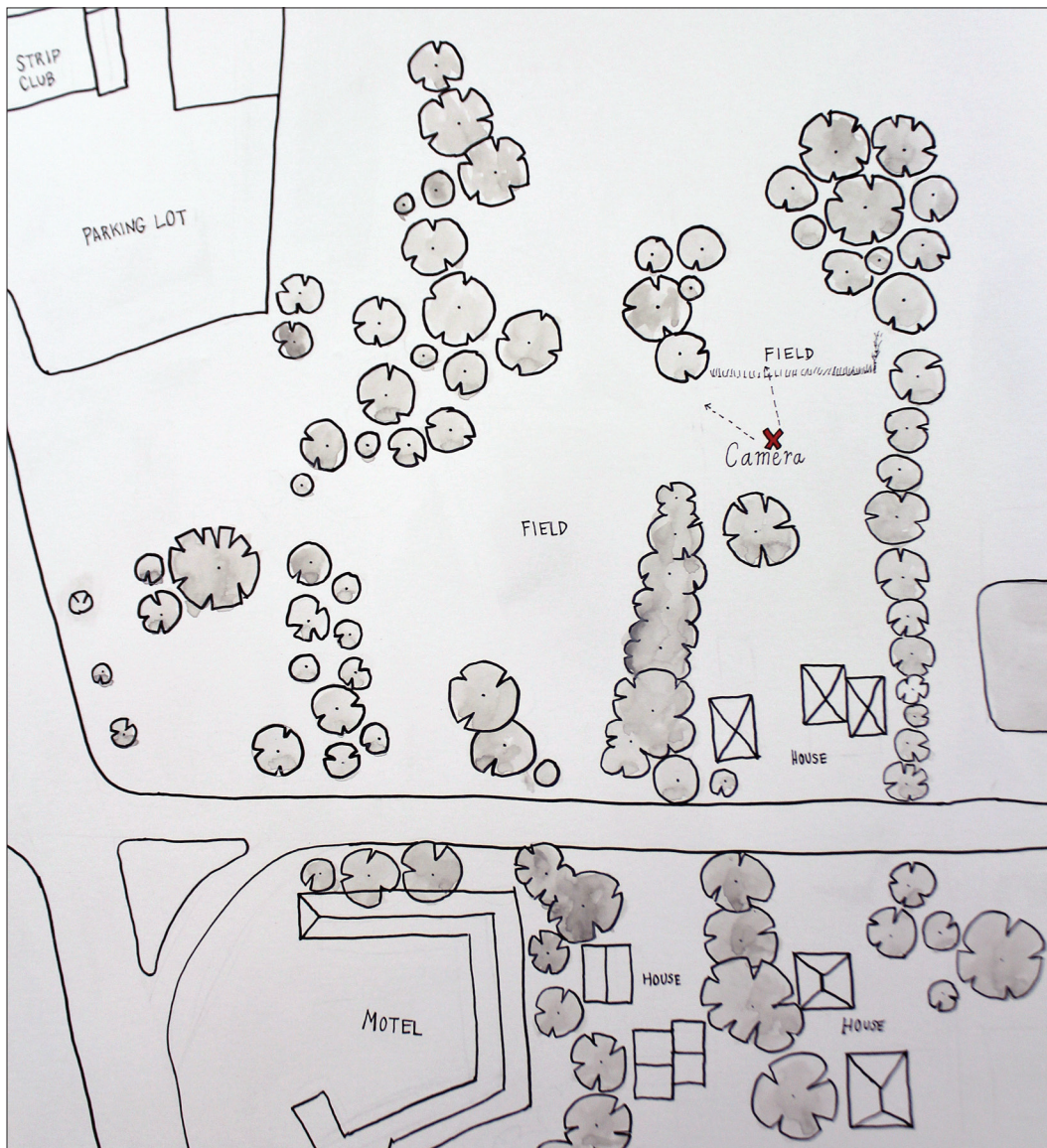


Illustration 28 Detail of *Niagara Falls Micro Map*

Responses to Thesis Exhibition

In general, the feedback from my show was positive. Most visitors admired the aesthetic qualities of the work. A gallery setting may not be the right place for these pieces, they might be better viewed somewhere where their context could be more easily be understood. The *Coyote Conversations* pieces may work better as installations in public spaces, either in parks or alongside train tracks or bike paths. As an initial exploration into wildlife cameras for collecting images and drawing as a methodology for translating data, they have offered me much insight into possible applications for future work.

Chapter Seven: Conclusion

... if we look at our stories and our histories and even at our common goods, we discover that they do not constitute a community of humans, but rather a community of living beings of many different types. I call this 'Deep Community,' and I have argued for it in some detail elsewhere. The point is that the stories we tell do not separate humans from animals, but rather tie the living world together as one. Our stories are all interconnected, as are our goods. If one attempts to unweave these strands, they cannot stand alone. I cannot tell the story of who I am without telling the story of the animals around me: I am constituted, in part, by them.

— H. Steeves

Summary

I began my investigations with open source tracking technologies to learn more about how sensors and cameras are used by biologists in their field research. I implemented motion sensors in a few basic projects. The real benefits of tracking technologies emerged as I researched applications of wildlife cameras and spoke to open source makers about cameras. What I learned then helped me decide to use cameras for my final thesis work. Some of my initial explorations included drawing maps from a non-human perspective and played with ideas of human/non-human communication.

In order to have a range of observational methods, I used several types of data collection. I interviewed open-source makers, connected with a local wildlife organization and conducted two online surveys. I looked to human-centred design frameworks to learn how to research community issues. I reviewed ecological and post-humanist theory to understand more clearly traditional and contemporary cultural responses to non-humans.

Once I had refined my thesis approach, I helped set up a wildlife camera in collaboration with Coyote Watch Canada to record photographs of a coyote family. These methods

gave me a mix of data and photographs to work with for my final thesis pieces.

I returned to a creative methodology for interpreting my collected data. Drawing became a key method of translating and mapping. In *Coyote Conversations*, the work is created from laser cut pieces of masonite, but they are based on drawn type and photographs of coyotes. I investigated how to use drawing as a method for demonstrating theoretical concepts and layering photographic images on top of each other.

In addition to using drawing as a methodology for interpreting still images from that camera, I used drawing to create maps that showed macro and micro views of Southern Ontario. This enabled me to provide some context of where coyotes live and how they can move through urban and suburban landscapes.

I seek to acknowledge the desire for kinship that we have innately with other non-humans and show how coyotes are beings with their own lives intertwined in our urban and suburban landscapes. My thesis work shows one possible approach to understanding a multitude of perspectives for coyotes. In this approach, research provides opportunities for insights about coyote biology and behaviour. This method of understanding a subject could be extrapolated to other case studies involving humans and non-humans as creative interventions.

Understanding my role as a designer who can use research and facilitate and moderate conversations, while valuing the input of all participants has been a key part of my thesis.

Future Directions

There are three paths where I could continue my thesis investigations further: with mapping, by working more closely with biologists who are collected data from tracking non-humans and by continuing with creative interventions that are installed in public spaces.

I touched on combining ethnographic and geographic data together with my Toronto Green Spaces map. This was a basic exploration that used hand-written text on thin strips of vellum attached in a layer on top of the drawn map. The text was the coyote definitions from my *People & Wildlife* survey. Further explorations could use type to show a deeper analysis of the text being used. Much as I used peoples' stories to define the bodies of coyotes, the text of their survey answers could define the map in more experimental ways.

Creating maps of other Canadian cities besides Toronto from a wildlife perspective would indicate how much green space different cities have and what kinds of wildlife friendly pathways are in each region. Using these as a basis for layering other kinds of data could be interesting, such as migration routes or sites of human/coyote interactions.

As I continued my research, I found several ongoing projects where coyotes were being tracked or other data was being collected. It would remove a lot of technical considerations to partner with more experienced scientists that are using cameras and tracking sensors to collect data. One of the strengths of *Bear 71* was that there was a huge database of footage and photographs from remote cameras at Parks Canada (Hutter). It was the existing footage that became the basis of Bear 71's story. Collecting usable data is an entire field

in its own right, making provoking and engaging work with it as well is something I could spend many years doing.

Installing the *Coyote Conversations* pieces in public spaces outside could be a good way to incite further discussion and awareness about coyotes. As they are built from community responses, having them in parks and spaces where coyotes are connects them back to the community. Having larger pieces with different kinds of content from other sources could be a way to extend this piece further. The coyote bodies could show more biological data, such as the diet components in *Anything Delicious*, along with other stories about coyotes.

It has been an important focus of my thesis work to find supportive evidence in scientific papers that reflects what I have been reading in post-humanist theory. Integrating the perspectives of both science and humanities is an integral part of the interdisciplinary approach in my work and gives it more contextual relevance.

As a way of investigating methodologies and research to learn about integrating science into my work, it has been a beneficial opportunity to see what is possible. With this work concluding, I look to furthering my practice as a designer and interdisciplinary researcher to see how my perspectives deepen and change over time.

Discussion & Conclusions

My initial work with sensors and wildlife cameras showed me a possibility for documenting and observing a non-human world with minimal inference to non-human residents. Although this technology is anthropogenic, it gives us a chance to observe without

our physical bodies interfering (Easterson “Seeing Through the Eyes of an Armadillo”). The disembodied gaze may relieve some of the dynamic that our presence brings to an environment and help us find information to inspire new perspectives.

I started with a design issue and used design research methods, however my end result is more of a creative intervention rather than as a design solution. A design solution would have gathered community feedback in order to measure how effective it was. I made a decision to frame my work as creative interventions so that I could explore different methods of representing the data I had collected with more freedom.

I found many ways to explore different perspectives because of my interdisciplinary approach. Reviewing theoretical concepts related to my main research question along with scientific information helped me to find connections between the two disciplines. It also helped me see where biologists and theorists were part of a similar conversation around understanding non-humans as more than animal-objects. This is an encouraging prospect for relearning traditional ways of relating to coyotes and other non-humans.

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Appendix A: Online Questionnaire for Biologists

Welcome to my Wildlife Tracking Tools survey, a research project to gather information for my Interdisciplinary Masters' of Design at the Ontario College of Art & Design in Toronto, Ontario.

This survey has 23 questions. It should take you about half an hour to complete. All participants must sign a letter of consent, if you have not received one please let me know via email and I will send one to you.

If you have any feedback, questions or concerns that haven't been covered in your letter of consent, please write to me: cg11gc@student.ocadu.ca.

Calliope Gazetas

Tracking Technologies: Basic Information

1. What is your first name?
2. What is your last name?
3. What is your preferred email address?
4. What are your current research goals that are informed by tracking wildlife?
[text box for answer]
5. What animals are you currently tracking as part of your research?
[text box for answer]
6. What animals have you studied previously?
[text box for answer]
7. What animals do you hope to track in future studies?
[text box for answer]
8. What types of data do you collect? (Check boxes, all or none can be selected)
☐ Location (latitude & longitude) ☐ Range
☐ Depth (marine) or altitude (avian/insect)
☐ Proximity to other animals, whether same species or different species
☐ Other, please specify?
 [text box for details on Other]

9. What types of tools are you using or have used to track animals in the field?
(Check boxes, all or none can be selected)
☐ Acoustic/Sonar ☐ Radio
☐ Archival ☐ Satellite
☐ Dual Mode (tracking through multiple receivers for one transmitter)
10. What are your criteria for using one type of tracking tool over another?
Please select all that apply.
☐ Cost ☐ Customization ability (can use it on more than one type of animal)
☐ Ease of setup
☐ Size ☐ Weight
☐ Can be attached or secured easily to the species being studied
☐ Ease of download of data ☐ Ease of collaboration with other scientists
11. Are there other criteria which informs your decision to pick a particular tool?
[text box for answer]
12. Do you use tracking technology from any of the following companies?
☐ Biotrack <http://www.biotrack.co.uk>
☐ BioSonics <http://www.biosonicstelemetry.com/>
☐ Sirtrack <http://www.sirtrack.com/>
☐ Argos <http://www.argos-system.org/>
13. If so, how much setup do you have to do in order to starting receiving and analyzing data?
[text box for answer]
14. Do you work in teams for your tracking projects? For instance, does one researcher work with the data, one sets up the tracking software, and one does the programming?
[text box for answer]
15. If your research is team-based, what is your role within that team?
[text box for answer]
16. What platforms and devices do you use in the field to collect your data?
☐ Laptops ☐ SD Cards
☐ Radio antennae
17. What do you use to map your data after it has been collected? Do you create data visualizations yourself or do other people on your team work on the data visualizations?
[text box for answer]

Tracking Technologies: Outreach

18. Based on the information you collect in your research, what would you want to share with a broader audience and possibly the general public?
[text box for answer]
19. What has been the most interesting result from your research to date that you want people to know about?
[text box for answer]
20. If you could use your data to reach more people to encourage more sustainable habits, what would you hope to educate people about?
[text box for answer]
21. What would you imagine could be the most interesting way to communicate your data to a broader audience?
[text box for answer]

Tracking Technologies: Future

22. Do you find your current tracking technology suits your needs as a researcher?
[text box for answer]
23. If anything, what's missing from your current set of tracking tools?
[text box for answer]
24. If you could build your own kits from open source hardware and software, would you be interested?
[] Yes [] No
[] Maybe, if it wasn't too complicated to set up
25. If you could design your own tracking tools, what would the ideal tracking system look like and what would it be capable of doing?
[text box for answer]
26. If you could change anything about how your data is visualized, what would it be? [text box for answer]

Thank you for your time and responses!

If you have questions or feedback, please contact me via email: cg11gc@student.ocadu.ca

Calliope Gazetas

Interdisciplinary Master's of Design candidate

Ontario College of Art & Design University

Appendix B: Wildlife Tracking Tools Survey Answers

Please refer to the CD inside the back cover for a spreadsheet file of these answers.

Appendix C: Questions for Makers

1. Please introduce yourself and give me a little background on what you and your company does.
2. Why did you begin working with animal tracking tools?
3. What are you currently working on that is active in the field now?
4. What might some of your future projects be?
5. What do you think is possible with the future of open source hardware and animal tracking technologies?
6. Tell me about one of your recent successes and why it was successful.
7. What do you feel are the benefits of open-source hardware for scientists?
8. What do you hope that biologists and other scientists will be able to do with open-source tools that they currently can't do with proprietary hardware and software?
9. How would open source hardware enable scientists to share their data with a larger audience outside of their own peers and colleagues?
10. While working with biologists and conservationists, what are they saying that they want to be able to do with their tracking tools?
11. What do you see as essential for the success of an open source hardware project?
12. In your experience, what is the best mix of skills and people on an open source project?

Appendix D: People & Urban Wildlife

Hello and welcome.

This survey consists of a series of short questions about where you live and what kinds of wildlife are in your area. It will take about ten minutes to answer.

These questions support research for my Interdisciplinary Master's of Design, at the Ontario College of Art & Design (OCADU). It has been approved by OCADU's Research Ethics Board (2012-30).

Your responses are anonymous and do not require you to provide an email address or other contact info.

The data collected for this survey will be deleted by December 31st, 2013. Anonymous data may be used in my published thesis and in my graduate thesis show. For more information, or if you have questions and/or concerns, please feel free to contact me: cg11gc@student.ocadu.ca.

Thank you,

Calliope Gazetas

Canadian Resident?

Do you currently live in Canada?

☐ Yes

☐ No

Population Centre

Do you currently live in an urban area (a city or town with at least 1,000 residents)?

☐ Yes

☐ No

Age

Are you 18 years of age or older?

☐ Yes

☐ No

I agree to have my anonymous answers from this survey used for the research purposes outlined above.

☐ Yes

☐ No

About You and Your Neighbourhood

Basic information about the neighbourhood you live in, your hobbies and interests.

What is your gender?

- ☐ Male
☐ Female
☐ Prefer Not to Answer

How old are you?

- ☐ 18-24
☐ 25-34
☐ 35-44
☐ 45-54
☐ 55-64
☐ 65 or Above
☐ Prefer Not to Answer

What Canadian city or town do you currently live in?

[text box for answer]

What best describes the type of neighbourhood you live in?

- ☐ Urban
☐ Suburban
☐ Rural

In your opinion, what are some of the components of your ideal residential neighbourhood?

[text box for answer]

Wildlife in Your Neighbourhood

Wildlife Coexistence Efforts in Your Community

Are you aware of any wildlife organizations in your community that are promoting coexistence policies? These could include advising city council on municipal bylaws, adding signage in parks, flyering, postering or other community outreach efforts.

- ☐ Yes
☐ No
☐ Don't know

What kinds of wildlife do you see in your neighbourhood?

- | | |
|------------------------------------|--|
| <input type="checkbox"/> Squirrels | <input type="checkbox"/> Raccoons |
| <input type="checkbox"/> Skunks | <input type="checkbox"/> Deer |
| <input type="checkbox"/> Rabbits | <input type="checkbox"/> Coyotes |
| <input type="checkbox"/> Rats | <input type="checkbox"/> Other, please specify... [text box] |

Have any of these animals caused issues with your property or pets?

- ☐ Squirrels ☐ Raccoons
☐ Skunks ☐ Deer
☐ Rabbits ☐ Coyotes
☐ Rats ☐ Other, please specify... [text box]

Pets and Outdoor Activities**Do you have pets?**

- ☐ Yes
☐ No

How often do you spend time outside in outdoor pursuits? Such as hiking, canoeing or kayaking, birding, hunting, foraging, or dog walking.

- ☐ Everyday
☐ Once a week
☐ 2 to 3 times a month
☐ Once a month
☐ Less than once a month
☐ Don't know

What are your favourite outdoor activities?**Please select more than one if it applies.**

- ☐ Boating
☐ Fishing
☐ Birdwatching
☐ Hunting
☐ Hiking
☐ Canoeing or kayaking
☐ Swimming
☐ Relaxing in cabin country
☐ Walking my dog
☐ Bicycling
☐ Motorcycling
☐ Skiing
☐ Snowshoeing
☐ Gardening
☐ Other, please specify... [text box]

Hunting

Do you hunt for sport and/or for food?

- ☐ Yes
- ☐ No
- ☐ Not applicable

Does anyone in your family besides yourself hunt for sport and/or food?

- ☐ Yes
- ☐ No
- ☐ Not applicable

How do you feel about hunting?

Wildlife in Your Neighbourhood

Among urban wildlife, sightings of coyotes are relatively recent compared to other types of animals. Although you may not have seen a coyote in your neighbourhood, please try to answer the following questions to the best of your ability.

Have you heard of hazing as a technique for frightening away urban wildlife, specifically coyotes?

- ☐ Yes
- ☐ No
- ☐ Don't know

About Hazing

Hazing is a combination of techniques that tells coyotes that they are not welcome, without hurting them. Hazing can include shouting, assertive body language such as waving arms and holding up objects to seem bigger, popping open an umbrella, throwing a tin can full of pebbles or coins (a shake can) or banging on pots and pans.

What is the best way to deal with having a coyote in the neighbourhood? Please select one option.

- ☐ Scare it away/hazing
- ☐ Keep pets on leash/inside, secure garbage and clean up bird feeders
- ☐ Live trap and relocate
- ☐ Trap and kill
- ☐ Don't know

Knowing what hazing is, would you feel confident using hazing techniques to frighten a coyote away?

- ☐ Yes
- ☐ No
- ☐ Don't know

Have you or your neighbours seen coyotes in your neighbourhood?

- ☐ Yes
☐ No
☐ Don't know

Are coyotes a benefit or a nuisance to a neighbourhood?

[text box for answer]

Have you heard of coyotes being in your neighbourhood or have you seen a coyote?

- ☐ Yes
☐ No
☐ Don't know

How concerned does that make you feel?

Scale of Not Very Concerned to Very Concerned (5 stops on scale)

Have you heard of or seen coyotes living (raising pups or creating a den) in your neighbourhood?

- ☐ Yes
☐ No
☐ Don't know

How concerned does that make you feel?

Scale of Not Very Concerned to Very Concerned (5 stops on scale)

Have you read or heard of a coyote incident in the news?

- ☐ Yes
☐ No
☐ Don't know

How concerned does that make you feel?

Scale of Not Very Concerned to Very Concerned (5 stops on scale)

About Coyotes**Do you know what family (or genus) coyotes belong to?**

- ☐ Canis
☐ Felis
☐ Vulpus
☐ Lycalopex
☐ Don't know

Do you know what species coyotes belong to?

- ☐ familiaris
- ☐ latrans
- ☐ lupus
- ☐ vulpus
- ☐ Don't know

Describe in your own words what a coyote is and what a coyote does:

[text box for answer]

Have you ever referred to any of the following animals as coyotes?

- ☐ Wolf
- ☐ Wolf/coyote
- ☐ Coyote dog
- ☐ Feral dog
- ☐ None of the above
- ☐ Don't know

If you hear about coyotes in your neighbourhood, from what media channel do you hear about them?

- ☐ TV
- ☐ Radio
- ☐ Internet
- ☐ Personal Experience
- ☐ Friends
- ☐ Family
- ☐ Hunters/trappers
- ☐ I have not heard about coyotes in my neighbourhood

Coyote Facts: True or False?

To the best of your abilities, please answer the following statements.

You are more likely to be bitten by a domestic dog rather than a coyote.

- ☐ True
- ☐ False
- ☐ Don't know

Feeding coyotes will prevent them from eating small pets.

- ☐ True
- ☐ False
- ☐ Don't know

There is more for coyotes to eat in cities and towns than in rural areas.

- ☐ True
- ☐ False
- ☐ Don't know

Coyotes don't belong in our cities.

- ☐ True
- ☐ False
- ☐ Don't know

Coyotes will avoid people as long as they are not being fed.

- ☐ True
- ☐ False
- ☐ Don't know

Coyotes are a part of our urban wildlife.

- ☐ True
- ☐ False
- ☐ Don't know

Coyote Diet

What do coyotes eat when they live in cities?

- ☐ Fruit/Berries
- ☐ Rodents (squirrels, rats, ground hogs)
- ☐ Pet food
- ☐ Garbage
- ☐ Cats & dogs
- ☐ Ducks or geese
- ☐ Deer
- ☐ Don't know

Is there anything else that you know or feel about coyotes that you would like to share?

[text box for answer]

Thank you for taking the time to complete this survey.

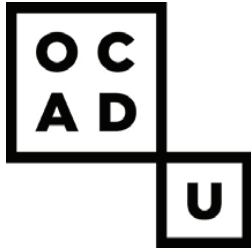
If you have any questions or concerns, please feel free to contact me:
cg11gc (at) student.ocadu.ca.

Calliope Gazetas

Interdisciplinary Masters' of Art, Media & Design student, Ontario College of Art & Design

Appendix E: People and Urban Wildlife Survey Answers

Please refer to the CD inside the back cover for a spreadsheet file of these answers.

Appendix F: Research Ethics Board Approval**Research Ethics Board**

October 9, 2012

Dear Calliope Gazetas,

RE: OCADU 67, "Tracking Technologies: Scientists and Open Source Hardware Makers."

The OCAD University Research Ethics Board has reviewed the above-named submission. The protocol dated October 9, 2012 and the consent forms dated October 9, 2012 are approved for use for the next 12 months. If the study is expected to continue beyond the expiry date (October 8, 2013) you are responsible for ensuring the study receives re-approval. Your final approval number is **2012-30**.

Before proceeding with your project, compliance with other required University approvals/certifications, institutional requirements, or governmental authorizations may be required. It is your responsibility to ensure that the ethical guidelines and approvals of those facilities or institutions are obtained and filed with the OCAD U REB prior to the initiation of any research.

If, during the course of the research, there are any serious adverse events, changes in the approved protocol or consent form or any new information that must be considered with respect to the study, these should be brought to the immediate attention of the Board.

The REB must also be notified of the completion or termination of this study and a final report provided. Attached is the reporting template.

Best wishes for the successful completion of your project.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Tony Kerr'.

Tony Kerr

Chair, OCAD U Research Ethics Board

Appendix G: Research Ethics Board Amendment #1**Research Ethics Board**

June 18, 2013

Dear Calliope Gazetas,

RE: OCADU 67, "Tracking Technologies: Scientists and Open Source Hardware Makers:" **Amendment**

The OCAD University Research Ethics Board has reviewed the above-named amendment. The revised protocol and consent process are approved for use within the original timeframe. If the study is expected to continue beyond the expiry date (October 8, 2013) you are responsible for ensuring the study receives re-approval. Your final approval number remains **2012-30**.

If, during the course of the research, there are any serious adverse events, changes in the approved protocol or consent form or any new information that must be considered with respect to the study, these should be brought to the immediate attention of the Board.

The REB must also be notified of the completion or termination of this study and a final report provided.

Best wishes for the successful completion of your project.

Yours sincerely,

A handwritten signature in cursive script, appearing to read 'Tony Kerr'.

Tony Kerr

Chair, OCAD U Research Ethics Board

Appendix H: Research Ethics Board Amendment #2**Research Ethics Board**

November 14, 2013

Dear Calliope Gazetas,

RE: OCADU 67, "Tracking Technologies: Scientists and Open Source Hardware Makers:" **Amendment 2**

The OCAD University Research Ethics Board has reviewed the above-named amendment. The revised protocol and consent process are approved for use within the original timeframe. If the study is expected to continue beyond the expiry date (October 8, 2013) you are responsible for ensuring the study receives re-approval. Your final approval number remains **2012-30**.

If, during the course of the research, there are any serious adverse events, changes in the approved protocol or consent form or any new information that must be considered with respect to the study, these should be brought to the immediate attention of the Board.

The REB must also be notified of the completion or termination of this study and a final report provided.

Best wishes for the successful completion of your project.

Yours sincerely,

A handwritten signature in cursive script, appearing to read 'Tony Kerr'.

Tony Kerr

Chair, OCAD U Research Ethics Board