

# **Making-With the Burrowing Owl: Value Sensitive Design as Sympoietic Method in Environmental Communication**

By Bella Goudie

20763985

Supervisor Dr. Marcel O’Gorman

Reader Dr. Jennifer Clary-Lemon

## INTRODUCTION

The Anthropocene, which is generally defined as the era in which human influence is the dominant factor altering the environment (Lewis and Maslin 171; Ehlers and Krafft 3), is irreversibly damaging the earth's eco-systems. This damage can be seen in the steep decline of vulnerable species, such as the Burrowing Owl (*Athene Cunicularia*). For example, from 1970 to 2003 the burrowing owl population of San Diego County saw a decline of approximately 90% (Johnston 19; Lincer and Bloom 2003). While this is an extreme case, burrowing owl populations have generally been in decline across Canada and much of the western U.S. (David Johnston 19; Sheffield 399). This decline has been driven by a convergence of several issues such as development and loss of habitat, pesticide use, and climate-crisis caused drought conditions (Barclay 53; Alberta 5-6). It is evident that we live on a damaged planet and that we are not alone in suffering the effects of such damage; plants, animals, land and so forth are all non-humans critically impacted by the climate crisis.

In *Staying with the Trouble*, Posthumanist scholar Donna Haraway argues that we, as humans, must stay with the trouble of living and dying “on a damaged planet” (1) to construct a livable future. Haraway suggests we do so by thinking and making sympoetically, that is to make-with the world and beings around us. However, outside of speculative thinking and design, Haraway provides little instruction on how to engage in sympoesis – as thought process or material practice. Other Posthumanist scholars such as Rosi Braidotti and Ron Wakkary provide some tools through which one can think relationally. Braidotti looks to speculative thinking, figurations, and the collective “we”, while Ron Wakkary suggests designer biographies, constituencies, nomadic practices, and humility are the way forward. However, these tools assume the human designer has already accounted for all the non-human stakeholders in relation

to a design project and that they are familiar with the process of thinking relationally. Moreover, these methods assume that the human designer has already identified and interrogated their biases for and against individual stakeholders.

This paper argues that Batya Friedman and David G. Hendry's Value Sensitive Design can provide methods to help designers think relationally. Value Sensitive design provides a framework and methods through which designers can identify a broad range of stakeholders early in the design process and identify points of connection between stakeholders. Value Sensitive Design emphasizes the importance of direct and indirect stakeholders and demands that the designer think about the relationships between stakeholders and their values. Although Value Sensitive Design broadens the concept of a stakeholder to non-humans, it leaves their inclusion an "open question" (Friedman and Hendry 28). As such, Value Sensitive Design is a method that encourages designers to think relationally across the human and non-human division and to make-with the value tensions between humans and non-humans. Thus, several of the seventeen methods outlined by Friedman and Hendry's *Value Sensitive Design: Shaping Technology with Moral Imagination* can be used to encourage designers to think beyond the immediate and human impacts of a design project to make-with non-human stakeholders.

This research project examines how Value Sensitive Design can be used in environmental communication to practice and embody relational thinking. This project engages Wakkary's notion of designer as biography. This project also engages Friedman and Hendry's methods of Stakeholder Analysis and Ethnographic enquiry into Values and Technology. In utilizing these concepts, this research project will seek to determine how Value Sensitive Design methods allow designers to make-with non-humans. This is demonstrated through a digitally produced zine about burrowing owl conservation efforts in Phoenix, Arizona. The digitally drawn, zine acts as

an “object-to-think-with” and has been developed as part of an existing series of environmental education pamphlets by the Arizona State University Institute for Humanities Research.

## **THEORY**

In order to learn to live with the damage caused by the Anthropocene, we humans must change the ways in which we engage with and think about the environment (Escobar 13). We must be critical of and change the status quo. Critical design is one possible method of critique. On a fundamental level, critical design aims to critique the status quo through the design process or through participant engagement with a designed object (Malpass 1-2; Malpass 42). For example, Dunne and Raby argue that one of critical design’s primary purposes is to “to help us become more discerning consumers, to encourage people to demand more from industry and society as critical consumers” as “design can help raise awareness of the consequences of our actions as citizen-consumers” (37-38). In this way, critical design encourages members of society to critique their own behavior within social contexts, as well as general society. This is largely because humans are fundamentally shaped by the world around us: “in designing we are creating ways of being” (Escobar 4). As such, design and a critique of existing design practice is essential if we are to answer Haraway’s call and learn to live on a damaged planet.

Critical design is a broad category that describes and includes various design theories, including social design, post-humanist design, and Value Sensitive Design. As a design practice, critical design “rejects a role for industrial design” as industrial design is “limited to the production of objects conceived solely for fiscal gain” (Malpass 1-2). Most importantly, critical design seeks to challenge hegemonies (Malpass 14) like capitalism, as previously alluded to. Critical design can also be used to critique other hegemonies such as humanism. Critical design can even be used to critique design practice itself, which is critical if one wishes to critique

humanism and the world that it has built. Wakkary argues as much in *Things We Could Design for More Than Human-Centered Worlds*: “the design discipline is as much an outcome of humanism as any other discipline. However, in design, humanism is foregrounded and is an organizing principle” (2). Rather, Wakkary argues design is fundamentally humanist because it is practiced by humans to serve human interest. This is further complicated by the fact that the category of human is exclusionary and limited, as Braidotti argues in *Posthuman Feminism*. Braidotti writes “humanism upholds an implicit and partial definition of the human, while claiming to provide a universal and neutral representation of all humans” (10). Ultimately, there are many bodies who should be considered human but under the universalization of humanism, are implicitly excluded from this definition. These bodies are commonly BIPOC, Queer, Women, and/or disabled (Braidotti 10). As such, in order to design for non-humans, the human-centric bias within design – both for its exclusion of certain human bodies and the disregard for nonhumans – must be acknowledged and critiqued. However, critical design in and of itself is too broad to critique humanism within design or meet the needs of this project. Critical design does not necessarily emphasize stakeholders nor non-humans, nor does it foster relational thinking: critical design does not explicitly critique humanism. As such, we must turn to specific theories that fall under the umbrella of critical design to create the livable future that Haraway imagines.

Posthumanist design is one design theory that falls under the umbrella of critical design, and which encourages designers to think relationally with the natural world. Posthumanist Scholar, Donna Haraway argues that the way to livable future on this damaged planet is through sympoesis. Haraway defines sympoesis as “making-with” (57). Indeed, Haraway argues that “nothing makes itself... that is the radical implication of sympoesis. *Sympoesis* is a word proper

to complex, dynamic, responsive, situated, historical systems” (57). Symposiosis is essentially the act of thinking relationally with non-humans as a means to disrupt humanism. Posthumanist scholar, Cary Wolfe similarly considers post humanism to be “a commitment to anti-anthropocentric thought, to the idea that the ‘human’ is not at the centre of the universe” (2). Posthumanist designer, Ron Wakkary affirms this thought as he challenges design hegemonies in *Things we Could Design: For More Than Human-Centered Worlds*. Rather, Wakkary argues that commonly, “human progress is a tenet in design” (5) and that human-centered thinking or humanism is one of the major issues with design, as he blames humanism (or a disregard for all things non-human) for the damages caused during the Anthropocene. To Wolfe posthumanism is not an outright rejection of humanism, nor is humanism inherently bad (2). Instead, humanism is “a legacy and an inheritance we have to work through” (Wolfe 2). Unfortunately, the legacy of the Anthropocene, the damage caused as a result of human-bias in human-thinking and design is a complicated and deeply embedded legacy to grapple with. Wolfe suggests that humans should be displaced from the centre of thought in general for the purpose of “coming up with better ways of thinking about many of the things philosophical humanism was interested in” (2), Wakkary similarly argues that humans should share “centre stage with non-humans” (5) in order to strengthen designs and build a better world. Indeed, recognizing that humans are not the only ones suffering the impacts of the climate crisis and that humanism may be to blame for the climate crisis is key to finding our way to Haraway’s livable future.

Feminist Posthumanist scholar, Rosi Braidotti looks towards the convergence of posthumanism and feminism. She names this convergence the “Posthuman Convergence”, as a way to “foreground the politics of hope and ethics of affirmation” (Braidotti 236). Rather, Braidotti argues that “Posthumanism and feminism are two sides of the same coin because

feminism is also a relational ethics”, and that feminism is a relational ethics because, as Braidotti forthrightly states, the ethics of feminism “assumes one gives enough of a damn about the world to look at the broader picture” (9). Ultimately, Braidotti argues that “‘We’ are all in this planetary condition together whether we are humans or others. It is high time for this heterogeneous and collective ‘we’ to move beyond the Eurocentric as well as humanistic habits that have formatted it” (5). While Braidotti mostly focuses on what posthumanism has to offer as an egalitarian movement for humans, her concept of posthumanism is still useful to post-humanism as whole, particularly as it reconceptualizes what it is to be human in the first place. Braidotti argues that feminism and posthumanism alike mean “creating the alternative visions of ‘the human’ generated by people who were historically from, or only partially included into, that category. It means creating other possible worlds” (3). In this convergence of the two schools of thought, we can see both relational thinking and Haraway’s practice of worlding. Moreover, Braidotti’s notion of the collective ‘we’ asks us to understand the false and interpenetrating boundary between human and non-human.

While Posthumanist design has the theoretical underpinnings to reach for the livable future that Haraway imagines by specifically critiquing the hegemony of humanism by encouraging relational thinking, there are few tools in posthumanism through which one can design these futures. In *Posthuman Feminism*, Rosi Braidotti writes of the power of figurations as a tool to critique hegemony and think relationally: “Thinking creatively through figurations seeks for a balance of sorts: it means adopting a relational, empathetic style, while remaining scientifically credible” (216). Figurations are effectively the product of speculative thinking and work to “dismantle the posture of scientific objectivity, academic hierarchies and lethal binary oppositions” (Braidotti 213).

Haraway similarly turns towards speculative fabulations in *Staying with the Trouble*. In chapter 8, “The Camille Stories: Children of Compost” Haraway recounts the results of a writing workshop called Narration Sp éculative. In this workshop, Haraway cowrites a story about Camille, a baby who is a symbiont and whose DNA is fused with that of a butterfly. Camille 1, as she is referred to in *Staying with the Trouble*, carries butterfly characteristics such as the ability to “perceive physically in the butterfly color spectrum” and “the muted tones and patterns of the monarch chrysalis” in her skin (Haraway 148-9). These traits are then passed on and altered through five generations of Camilles. The story describes not only the complex relations between symbionts to non-symbiont humans, but symbiont-symbiont relations and symbiont-non-human relations. The Camille story is a more literal take on becoming-with non-humans.

Wakkary provides some tools that provide more concrete opportunities for relational design. Wakkary looks to nomadic practices, humility, constituencies, and biographies as a way to foster relational thinking and to upend humanism within design. Turning first to Wakkary’s notion of designer as biography, Wakkary conceives of designers as a force inscribed on the world by the interdependent relationships between humans and non-humans. Wakkary writes:

A biography views the designer and the things it designs as inscribing themselves into the same lifeworld they cohabit. The purpose is to define a way to make the designer of things accountable for what it designs into the world and what it leaves behind... Biographies tie together the interdependencies of the assembly and lifeworld of a designer into one entity that may live on well beyond the human lives of the designer of things (238).

For Wakkary, a biography is a means by which the designer is made and held accountable to those impacted by a design, such as direct and indirect stakeholders. It is also a means by which

the agency of non-humans is acknowledged with the design process. As for Wakkary, the designer is not human, so much as an “interconnected human-thing” (174). However, writing a biography and designing as a posthuman subject cannot be achieved without humility. Wakkary goes on to state that humility is a key theme in his book and a key component of Posthumanist design: “a leitmotif of the book is a desire for humility in the human designer—a humility borne out of a posthuman subjectivity that is emergent, fallible, and a matter of differences rather than the universalizing ideal of humanism” (233-234).

All three, Braidotti, Haraway, and Wakkary, turn towards speculative thinking of some kind and yet the onus is often left to the individual to determine *how* to think through these relations. This is problematic, as individuals may be prone to unconscious biases and may inadvertently privilege certain stakeholders over others. They may also neglect certain stakeholders entirely. They may build bias into their designs as well without a method through which to horizontalize stakeholders. Additionally, as Braidotti rightfully points out, such practices often risk a tenuous credibility as “writing academic research in this speculative and figurative mode is risky business in the neoliberal university system, considering the quantified requirements of objectivity and neutrality that scientific research imposes on its practitioners” (215). Rather, without the appearance of neutrality and objectivity, these projects risk not being taken seriously in academia.

While some posthuman scholars have the capacity to think relationally in their design practices, others may struggle to recognize or be critical of their own biases. Posthuman scholars and designers need specific methods for recognizing a broad concept of what or who may be a stakeholder. Additionally, they need tools to help them identify and envision the relationalities between beings. While Wakkary’s constituency begins to head in this direction, this notion

begins with the assumption that one is already aware of all the stakeholders concerned and how they relate to the project. Ultimately, Posthumanist design needs methods by which designers can identify a broad range of stakeholders, while also interrogating their biases for or against certain stakeholders at a fundamental level.

### **Why Value Sensitive Design**

Value Sensitive Design is an approach to design thinking that centers the various values of stakeholders in the decision-making process. The emphasis of values is of particular importance as “all technologies to some degree reflect, and reciprocally affect, human values” (Friedman and Hendry 1). Rather, humans and technology shape each other according to the value systems embedded within them. As such, it is important to be critical of what we design and how we design, as in the process of designing we are also creating ourselves, the world around us, and ways of being (Friedman and Hendry 1; Escobar 4).

Value Sensitive Design as a design theory and method, can be categorized under the umbrella of critical design, as it aims to critique technological innovation’s incessant drive for progress and profit by guiding the shape of technological development through morals and ethics (Friedman and Hendry 3). Value Sensitive Design critiques such motivations by intentionally designing for that which “is important to people in their lives, with a focus on ethics and morality” (Friedman and Hendry 1). With its apparent techno and human centrism, Value Sensitive Design may seem like an odd choice for a zine about the burrowing owl. However, it is Value Sensitive Design’s inherently relational methods and its robustness that make it suitable for such a project.

Value Sensitive Design is able to support relational thinking through its inclusion and broad conception of stakeholders. Stakeholders are a broad category and extend into the non-human. In Value Sensitive Design, stakeholders can be “people, groups, neighborhoods, communities, organizations, institutions, or societies, and can also include past and future generations, non-human species, and other elements such as historic buildings or sacred mountaintops” (37). Moreover, Value Sensitive Design’s broad inclusion of stakeholders does not end with a broad concept of what a stakeholder can be. Indeed, the definition of a stakeholder is broad in the sense that stakeholders are not limited to those directly impacted by the project. That is to say that Value Sensitive Design readily includes both direct and indirect stakeholders (Friedman and Hendry 37-8). Not only does Value Sensitive Design encourage a broad conception of stakeholders, human and non-human, direct and indirect, but Value Sensitive Design requires that all their values be accounted for wholesomely, regardless of value tensions (Friedman and Hendry 45-46). That is to not say that Value Sensitive Design advocates for allowing values within a project to exist in conflict, instead, it encourages designers to find a diplomatic resolution that suits all parties, rather than simply discounting the value of a particular stakeholder (Friedman and Hendry 45-46). As such, Value Sensitive Design gives this project a framework by which to consider the needs of the owls, their habitat, other species, and their human counterparts.

It is evident then, that Value Sensitive Design as a framework can be useful for thinking relationally with the burrowing owl. However, the question remains: can such a seemingly tech centric method be applied to a project based in environmental communication and information design? Friedman and Hendry write that “at its core, Value Sensitive Design is technology agnostic. That is, in principle, the theory, method, and practice of Value Sensitive Design are not

tied to any specific technology” (21). Friedman and Hendry further prove this stance by showcasing various projects that Value Sensitive Design has been applied to over the years, such as security for mobile devices (115-121), privacy in online and public spaces (143-150), and Land Use, Transportation, and the Environment (150-156) among others. Perhaps most importantly, and in a somewhat meta fashion, the Value Sensitive Design Lab used their own approach to create Value Sensitive Design methods “that can be more readily incorporated into everyday design practice” (163). In doing so, they developed the Envisioning Cards to act as a design toolkit. These “consist of a set of 32 three-by-five-inch cards, a small sand timer, and an instruction booklet” (163). Such a set of cards is no more or less technological than a printed zine and yet the creators of Value Sensitive Design saw no reason that this approach could not be applied to their graphic and information design-based project. As such, I see no reason that this approach could not also be extended to a zine about burrowing owls. Moreover, Value Sensitive Design is intended to be a robust approach. One that “[doesn’t] break when presented with a new set of values, a new technology, a new population, or a new context or circumstance of use” (Friedman and Hendry 9). As such, applying the theory to a hand-drawn pamphlet is merely a new circumstance of use, and not an exceptionally different use from that of the envisioning cards.

Ultimately, the path to Haraway’s livable future requires more than speculative practice. In order to think relationally, designers need concrete tools in the early stages of the design process to learn how to recognize and emphasize with stakeholders. While Braidotti and Wakkary offer certain practices that allow designers to allow designers to imagine livable futures, they do not afford designers the opportunity to interrogate their biases. Earlier intervention is needed in the design process as many of these methods assume a baseline empathy and understanding of the stakeholders. The framework of and methods within Value

Sensitive Design afford designers this opportunity to come to understand stakeholders in a relational, empathetic, and ideally humble manner.

## **METHODS**

Haraway writes repeatedly in *Staying with the trouble*, that “it matters what matters we use to think other matters with; it matters what stories we tell to tell other stories with; it matters what knot knots knots; it matters what thoughts think thoughts” (12). Indeed, it is important to account for the methods that uphold our current practices and belief systems and vice versa. Rather, the tools or methods we use to understand or explain something ultimately shape our understanding. Thus, it is imperative to be critical not only of the design object but also the design methods and practice.

This project uses two methods from Friedman and Hendry’s *Value Sensitive Design: Shaping Technology with Moral Imagination*, Direct and Indirect Stakeholder Analysis and an Ethnographic Enquiry into Values and Technology. These two processes are outlined as methods one and eleven respectively, under Friedman and Hendry’s seventeen methods for Value Sensitive Design. The stakeholder analysis started prior to and continued throughout the research trip to Arizona. Meanwhile, the ethnographic enquiry was conducted only during the research team’s time in Phoenix, Arizona. The information gathered during the stakeholder analysis and the ethnographic enquiry were then used to develop a values map, which was then used as a heuristic to inform the development of the burrowing owl zine.

### **Stakeholder Analysis**

According to Friedman and Hendry, stakeholder analyses are “commonly employed by organizations to clarify project scope by systematically identifying individuals and groups that

might reasonably be affected by the technology under investigation” (64). In this case, the technology in question would be the artificial burrows and the broader translocation project. The stakeholder analysis of the burrowing owl translocation project in Phoenix, Arizona began before the Waterloo research team’s arrival in Phoenix. The Waterloo Research Team consists of Dr. Jennifer Clary-Lemon, Dr. Marcel O’Gorman, PhD candidate Chris Rogers, and MA in Experimental Digital Media Bella Goudie. Through a series of virtual meetings and emails, a variety of human and organizational stakeholders were identified. These include, but are not limited to, Field Biologist Heather Bateman, Field Biologist Adam C. Stein, current and future biology students, Fine Art Instructor Alejandro Acierto, current arts students, UX Instructor Andrew Mara and current UX students. Oftentimes, one stakeholder would identify another over the course of a conversation, thereby making it known who was involved in the project to the Waterloo research team.

Typically, these stakeholder analyses typically focus on human stakeholders, whether they are individual humans or human organizations, much like the initial phases of this project. However, in Value Sensitive Design the definition of stakeholder is broadened to include non-human entities (Friedman and Hendry 64) and “the emphasis is placed on identifying and legitimating stakeholders, including enumerating the ways in which stakeholders might be affected, along with documenting potential benefits, harms, and tensions” (Friedman and Hendry 64). Additionally, the definition of stakeholder is broadened from merely direct stakeholders to include indirect stakeholders.

The stakeholder analysis continued once the Waterloo research team was on-site in Phoenix, Arizona. Being on-site meeting with stakeholders in person and witnessing the places where the translocation projects take place allowed us to broaden our understanding of the

stakeholders involved from the human to the non-human. Being onsite also allowed us to recognize more indirect stakeholders. For example, being on an artificial burrow site with Jenohn Wrieden, a Biologist and Habitat Technician with Wild at Heart, helped the team to identify disused land as a non-human stakeholder, as this is commonly used for burrowing owl habitat. Similarly, a student in Alejandro Acierito's class identified ground hogs as an indirect stakeholder as they tend to interfere with and block burrows. This was identified while the Waterloo research team was on the Estrella Mountain translocation site and was noted because of the blocked burrows onsite.

It was, as Friedman and Hendry acknowledge, challenging to identify indirect stakeholders as the indirect effects of a project are often "widespread and diffuse" (65). However, working collaboratively with the Waterloo research team and human stakeholders, such as Jenohn or the UX design class with whom we ran a stakeholder analysis workshop, helped to generate a broad consideration of who or what could be impacted by the burrowing owl translocation project.

### **Ethnographic Enquiry**

The Ethnographic Enquiry into Values and Technology was conducted over the duration of the Waterloo research team's trip to Phoenix, Arizona and was conducted alongside the stakeholder analysis. Friedman and Hendry define this process as a "framework and approach for data collection and analysis to uncover the complex relationships among values, technology, and social structures as those relationships unfold" (63). In the context of this project, the ethnographically informed enquiry focused more upon the values and stakeholders at play, rather than the available technologies.

During the Waterloo research team's time in Phoenix, conversations were held with various stakeholders, including representatives of Wild at Heart, Arizona State University (ASU) Media Relations, ASU Faculty, ASU Students and so forth. This afforded the team the opportunity to understand how various human and organizational stakeholders may feel about the burrowing owl translocation project, how they relate to other stakeholders, what they hoped to accomplish with the project, and why the project was important to them. With this information, the Waterloo research team was able to identify the relations between stakeholders and their values as they relate to the burrowing owl translocation project.

In addition to speaking with representatives of various stakeholder groups, the Waterloo research team also visited sites related to the translocation project. These sites included the Estrella Mountain Community College and their artificial burrow site; Arizona State University and their (at the time) abandoned artificial burrow sites, this included the Main, West, and Polytechnic campuses; the site where many of Wild at Heart's artificial burrows are constructed; and a successful, large, rural artificial burrow site. As a Value Sensitive Design method, ethnographic enquiry is particularly useful for "identifying and clarifying values and value tensions" (Friedman and Hendry 78). Being onsite where the artificial burrows are typically built, where the owls are often translocated to, and holding Value Sensitive Design workshops with students allowed the Waterloo research team to begin to identify possible values held by non-human stakeholders. It was during one Value Sensitive Design class, where a student identified artificial burrows as a possible non-human stakeholder and another student identified integrity as a possible value of the artificial burrows. Integrity proved to be a prominent value in the project and made it onto the final iteration of the values map.

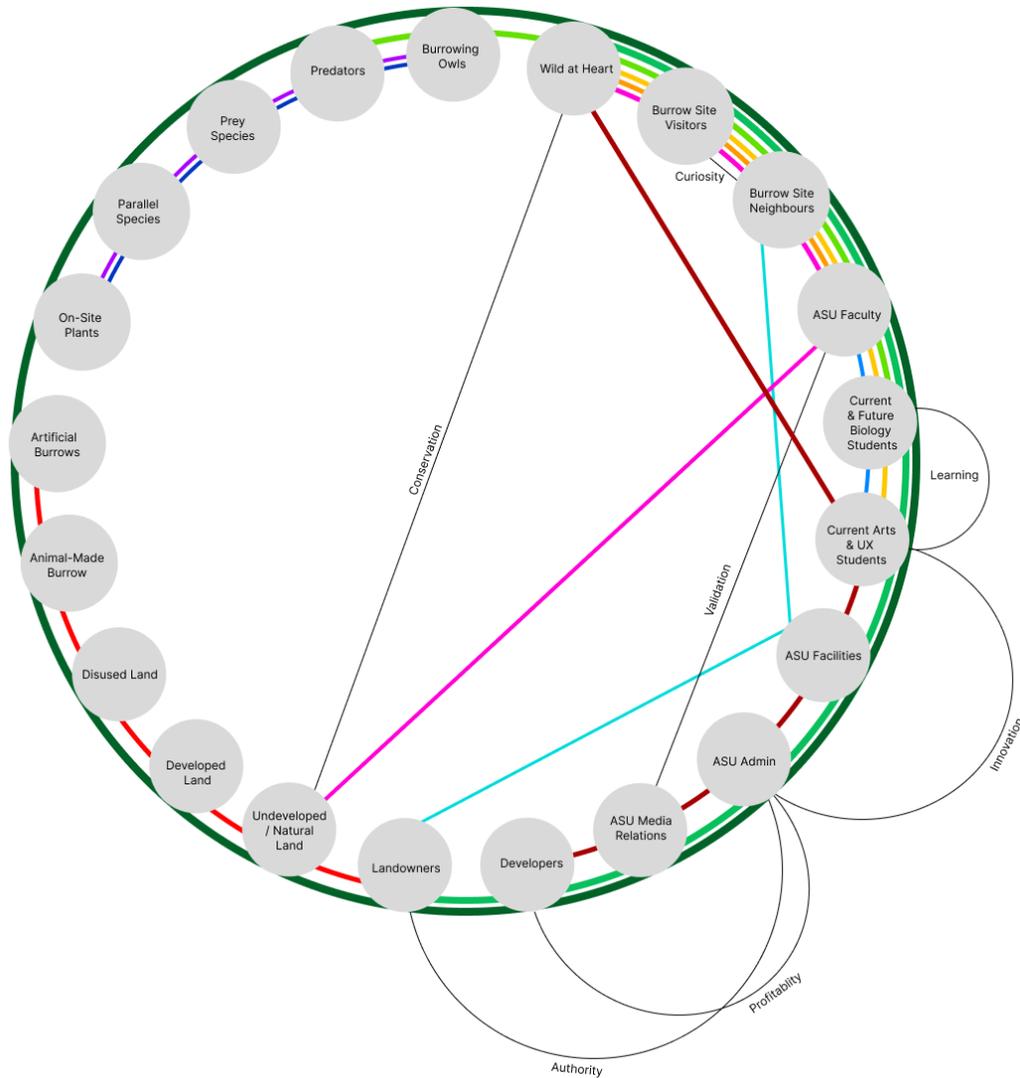


Fig. 1. Burrowing Owl Translocation Project Values Map by Bella Goudie

Top 12 Values

1. Survival (All)
2. Pride (11)
3. Owl Welfare (7)
4. Hope (6)
5. Engagement (6)
6. Intensity (6)
7. Reputation (6)
8. Education (5)
9. Reproduction (5)
10. Security (5)
11. Achievement (3)
12. Safety (3)

Other Values

- Curiosity
- Learning
- Validation
- Profitability
- Conservation
- Authority
- Innovation

Fig. 2. Values List Corresponding to Burrowing Owl Translocation Project Values Map by Bella Goudie

## Values Map

The values map, as seen in fig. 1 is a representation of the top shared values held by each of the stakeholders in the burrowing owl translocation project. While values mapping is not a tool explicitly outlined in Value Sensitive Design, it is being used as a heuristic to map the information acquired during the direct and indirect stakeholder analysis process and the ethnographically informed enquiry on values and technology. The values map was then used to inform the creation of the burrowing owl zine.

The values map consists of 21 direct and indirect stakeholders as they relate to the project. For example, burrowing owls, who have the most to gain from artificial burrows and the positive publicity of an informational zine about them, are a direct stakeholder. Alternatively, prey species or predators of burrowing owls, who are impacted by fluctuations in owl populations, can be considered indirect stakeholders. The stakeholders represented also encapsulate a broad conception of what it is to be stakeholder, as Friedman and Hendry argue is key to the application of Value Sensitive Design (37). This values map aims to include a broad range of stakeholders including human stakeholders such as “burrow site neighbors” and “current and future biology students”; organization stakeholders such as “ASU Media Relations” and “Wild at Heart”; Non-human animal stakeholders such as “Burrowing Owls” and “Prey Species”; and lastly non-human, non-animal stakeholders such as “Artificial Burrows” and “Developed land”. While earlier versions of the map included specific individuals as they relate to the project, these individuals were collapsed into their respective stakeholders. This was done for the sake of equity, to minimize the duplication of values and which would therefore skew the representation of certain values. This is where the project begins to orient itself towards

relational thinking in general as well as Wakkary's notion of horizontality: to mitigate the privilege of verticality that humans often assign. Rather, Wakkary argues that,

In many respects the dominant human orientation toward space has been verticality... To assume horizontality embodies all the resistance to the loss of human privilege, a fall to the ground... horizontality embodies the relationality and expansiveness as action required for designing-with. This speaks to positioning oneself alongside other humans and nonhumans to literally expand the points of contact and increase the multiplicity of relations through greater proximity. (251)

In this sense, Wakkary sees leveling the playing field between humans and non-humans as a step towards relational thinking in posthuman design.

To further horizontalize the privileges of certain stakeholders, the values map uses a circle to allow all stakeholders to present as equal parties within the project and to allow the human designer to view the relations between stakeholders in a horizontal manner. Some may argue that a straight line would be the ideal shape for erasing all vertical privilege and designing horizontally. However, in the context of mapping connections between stakeholders, a circle allows for a cleaner and more cohesive design. Moreover, the circle represents the notion of a connected and collective "we", which Braidotti argues is critical to an affirmative posthuman ethics as "it involves imagining a collective subject as the 'we' who are not one and the same, though we are in this posthuman predicament together" (Braidotti 13).

Indeed, circles allow for symmetry not only across two sides of a page but around all 360 degrees of the shape, this is useful as "symmetry is a predictable arrangement that implies order and balance. It suggests peacefulness and stability" (White 41). As such, circles represent unity

in their symmetry. In this way, the circle shape of the values map represents the collective ‘we’ and balances out the possible privileges experienced between stakeholders. Of course, one may argue that the circle still assigns a vertical privilege because there is a “top” of the circle, I would encourage one to lay the page flat so to speak. Rather, imagine the circle in the y-axis rather than the x-axis: it is a gathering around a campfire, not a Ferris wheel. Moreover, I would argue such thinking is not an issue of this design, so much as an inherent bias towards the hegemony of verticality. “It matters what thoughts think thoughts” (Haraway 12) and it is vital that we try to be conscious of the biases we inscribe onto designs.

### **Speaking for Non-Human Stakeholders**

One challenge of designing for non-human stakeholders is determining what values may be held by non-human stakeholders. While it is made clear by Friedman and Hendry that Value Sensitive Design *can* include and design for non-human stakeholders and provides a useful framework for thinking relationally, they do note that “how to account meaningfully for the values of non-humans within Value Sensitive Design remains an open question” (29). Rather, *how* designers can determine the values of non-humans is not outlined by Value Sensitive Design. As such, it may be more fruitful to turn to other design theories and methods. Post-humanist design is one such theory that may offer some meaningful ways forward.

Both Wolfe and Braidotti discuss the complexities of representing non-human others, Wolfe deems it “not just the artistic challenge, but also the larger philosophical and ethical challenge, of speaking for nonhuman animals” as “taking those relations seriously unavoidably raises the question of who “we” are” (68). Wolfe ultimately suggests that non-humans reside “at the very core of the human itself” (17). Rather, he argues that the human and the non-human are interpenetrating, “not as the primitive and pure other we rush to embrace as a way to cure our

own existential malaise, but as part of us, of us” (17). Wolfe argues that humans are not the creatures we believe them to be, but rather a part of non-humans. In a similar vein, Braidotti argues that “it is less a matter of representing others, or speaking on their behalf, than about joining in this collective construction of affirmative ways of knowing” (216). For Braidotti, it is a matter of acknowledging the agency of non-humans and recognizing their impacts on us as humans: this helps us to recognize the relationships between humans and non-humans, which in Wolfe’s view is effectively a false binary. Wakkary also writes about the agency of non-human actors, and this is critical to his designer as biography concept.

Ultimately, recognizing the agency of non-humans is not a matter of speaking for them, so much as a matter of speaking-with them. Further, it is a matter of recognizing Braidotti’s collective “we”, in the sense that we are deeply interconnected with non-humans. In this sense, determining the values of non-humans, when done with a generosity of spirit and humility of the designer, is not an issue of speaking for non-human stakeholders but a matter of recognizing them as equal stakeholders in the matter.

### **The Values**

Under Value Sensitive Design, values are broadly defined as “what is important to people in their lives” with an emphasis on moral and ethical values (Friedman and Hendry 22-23). Friedman and Hendry acknowledge that this human-centric definition of values can be problematic when accounting for non-human stakeholders. However, if one applies Wolfe’s notion that non-humans are at the core of the human or Braidotti’s notion of the collective ‘we’, in which humans and non-humans construct each other, the notion of human values becomes a blurred boundary. Human values and non-human values become just as relational as humans and non-humans, particularly as all “values sit in a delicate balance with each other” (Friedman and

Hendry 25). As such, human values and non-human values are as much of a false binary as humans and non-humans. Now onto the values themselves.

On the map, the most commonly held value is that of survival. It is represented on the map by a dark green circle with a point 7 thickness and is shared among all the stakeholders. The next most commonly held value is pride which is held by 11 stakeholders. Pride is represented by a point 6 size, light-green, semi-circle. Each value decreases in point size down to a point 1 line, which is used to represent values held by less than 3 stakeholders. The top twelve values are as follows: Survival, Pride, Owl Welfare, Hope, Engagement, Integrity, reputation, education, reproduction, security, achievement, safety. The values held by less than 2 stakeholders were as follows: curiosity, learning, validation, profitability, conservation, authority, and innovation.

Ultimately, the value that connects all stakeholders is survival. The human, the nonhuman, the direct, and the indirect. The burrowing owl, in crisis, needs human help to survive these man-made challenges. Human organizations such as Wild at Heart are directly invested in the biological survival of the burrowing owl as a species. Arizona State University, while it is invested in the survival of the burrowing owl, is also invested in its own institutional survival and in its own ability to continue to educate students and conduct research. Even land developers are invested in the economic survival of their own companies. These different types of survival may be or seem to be at odds with each other. For example, the economic survival of urban developers currently undermines the biological survival of the burrowing owl due to the loss of habitat. Evidently, these tensions are particularly apparent at the boundary between the human and the more-than-human, particularly when certain values have traditionally been placed above others. For example, the economic well-being of companies and economies at-large have commonly been placed above the well-being of the environment and non-human species.

However, such value tensions also open up opportunities for creative problem solving. For example, under what conditions could humans and owls cohabit on the same land? How can developers design to achieve this goal? What could it look like to live-with the burrowing owl?

In direct relation to the zine, the value of survival shapes the ways in which stakeholders are represented. Is it fair to present what developers do as inherently bad when their aim is to a) provide housing which is critical to human survival and b) to survive as a company?

Alternatively, is it fair to present the burrowing owls need to survive as inherently less valuable than that of humans? Development itself is not bad and the survival of the burrowing owl is important. I would note, as a small caveat, that while development is not inherently bad, the way in which we choose to develop is problematic and contributes significantly to the degradation of the climate, vulnerable species, and natural land: *Unsustainable* development is damaging. As Escobar writes, development is a “design disaster” (6-7) and it needs to be confronted.

Now that it is clear that the survival of the owls and of the developers is important to the burrowing owl translocation project, it is important not to impinge on the character of either. Owls should not be presented as a nuisance to development and developers cannot be presented as the villain, outright causing the decline of burrowing owls. At the same time, development is an issue that is compromising the burrowing owl’s ability to survive, and this fact cannot be obscured without impinging the impartiality of the zine. As such, rather than naming developers, the human actors, the problem the zine instead refers to “development”. Similarly, instead of depicting human actors, development is represented by the image of a bulldozer. In this way, the zine refers to the system of development as problematic rather than the people involved in developing land. Neutral but factual language is also used to describe this tension between owls and developers: “residential and commercial development has led to habitat loss”. As such the

tone is not accusatory, but the cause of habitat loss is not obscured. Therefore, the impartiality of the zine is preserved.

This tension between the burrowing owls and developers is just one of many value tensions within the burrowing owl translocation project, however, it is perhaps the best example to illustrate how such tensions were accounted for in the design of the project. Similar tensions were found between owls and their predators; owls and landowners; owls and their prey and so forth.

Looking to the shared value of survival, even when the survival of one stakeholder appears to directly threaten the survival of another, further helps one to emphasize with stakeholders and “horizontalize” them. This point of connection, survival as value, between all the stakeholders allows one to understand what Haraway means by living and dying *together* and a means of coming to understand Braidotti’s collective ‘we’. In this way, the Direct and Indirect Stakeholder Analysis and the Ethnographic Enquiry in to Values and Technology which informed the values map allowed the Waterloo research team the opportunity to recognize a myriad of direct and indirect stakeholders and to come to understand the values these stakeholders may hold. Being on-site allowed the team to understand each stakeholder with greater empathy. By generating this information into a values map and recognizing the shared values across stakeholders, the human designer was better able to recognize the deeply embedded relationships between stakeholders and how they have shaped the project, in this way acknowledging Braidotti’s collective “we”. Further, the values map helped to horizontalize the privileges between stakeholders. This informed the zine in the ways that stakeholders were represented in the zine, as well as other ways which will be discussed in depth in the next section.

## **APPLICATION**

## **Zine Layout**

The Value Sensitive Design methods shaped the way that stakeholders were conceptualized in relation to the burrowing owl translocation project and in the ways in which they were textually represented in the zine. However, conceptualizing the stakeholders in this manner also shaped the zine in several other ways. To start, the layout of the zine is intended to foster relational thinking by visually depicting many of the stakeholders on a shared page and explaining their connections. The back side of the pamphlet, with the landscape scene, is designed in such a way as to present and draw out the various connections between some of the central stakeholders to encourage readers to think relationally. Starting with the burrowing owl in the bottom left section, the zine draws connections to prey species, companion species, predator species, artificial burrows, Arizona State University, developers, and the land itself. Each of these stakeholders can also be found on the values map.

Additional stakeholders such as Wild at Heart, Greg Clark, and indigenous audiences can be found on the back of the pamphlet. While highly important to the project, due to the amount of text dedicated to these stakeholders it was determined they would need to be included on the front side of the pamphlet so as not to obscure too much of the landscape and so that the respective texts could be fulsome.

## **Style Guide and Colour Palette**

In order to develop the style guide, I needed to first develop a sense of aesthetics for the owl. How are burrowing owls described by stakeholders and how can that translate to a visual style? Upon review of my notes regarding the observed conversations with various stakeholders, there were several key words used to describe the personalities of the burrowing owl: quirky,

energetic, sociable, unique, charismatic, excitable, independent, bright, clever. Quirky and Charismatic were perhaps the most common words used to describe the burrowing owls.

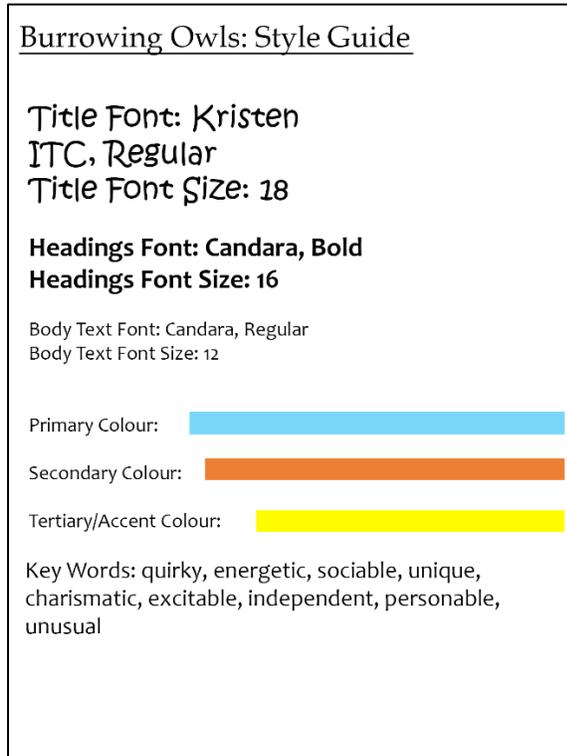


Fig. 3. Zine Style Guide Version 1 by Bella Goudie

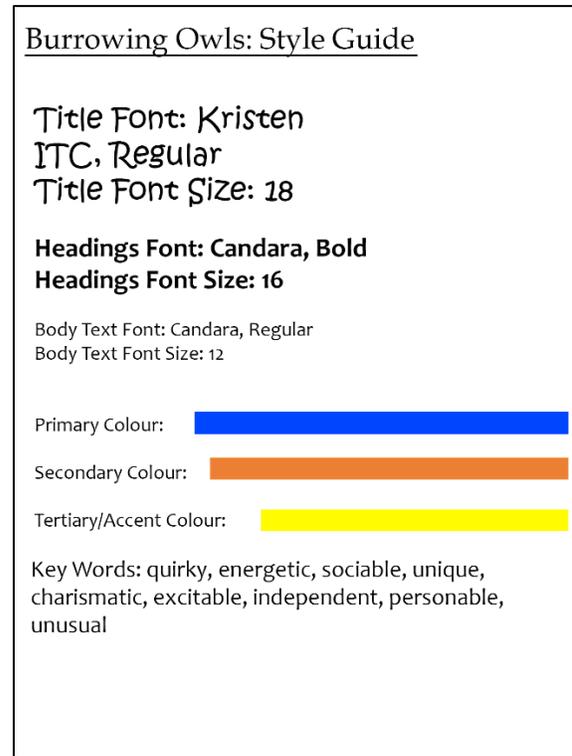


Fig. 4. Zine Style Guide Version 2 by Bella Goudie

The original colour palette recommended for the project consisted of the colors as seen in fig. 3. These colors were based on colors sampled from images of the Sonoran Desert, burrowing owls, and the Phoenix area. These colors were then brightened to bring a more dynamic energy to the pamphlet. The orange-blue complimentary colour palette was particularly useful to this end, as contrasting colour are “are considered to enliven each other and enhance hue intensity” (O’ Connor 845). However, due to the technical constraints of the risograph printer, the electric blue colour was not available. As such, the colour of the palette has changed to that seen in fig. 4. Ultimately, yellow was chosen as an accent colour to highlight the eyes of the borrowing owl, which are often noted as one of its most striking features, and to represent the sun in the Sonoran

Desert. In this way, drawing relational links between the owl and its habitat. The orange colour was chosen to represent orange tones found in the rocks and the sand in the Sonoran Desert. The blue colour was chosen to represent the sky, as shadows throughout the zine, and to complete the complimentary palette. Ultimately, the colour palette is meant to invoke the gestalt of the Sonoran Desert while bringing energy, charisma, quirkiness, and brightness to the palette – all of which have been associated with the burrowing owl.

As for the fonts, Candra Bold size 16 was chosen for headings and Candara Regular size 12 was chosen for the body text. Meanwhile, Kristen ITC, Regular, Size 18 was chosen as the title font. Candara was chosen for the headings and body text, partly for the sake of simplicity as “the more uninteresting a letter is, the more useful it is in typography” (White 153). Candara as a sans serif font was particularly useful as the CNIB (Canadian National Institute for the Blind) typically recommends sans serif fonts. However, Candara also afforded the opportunity to present an aesthetic that was simple and accessible while quirky. Rather, Candara is not a commonly used font, and its use of line gives a sense of unpredictability. Similarly, Kristen ITC Regular also afforded the opportunity to express a quirky affect. This is largely attributed to the font’s rounded form, unpredictable line, and curvature. However, due to its limited legibility and due to the inconsistency of curvature between different letters, Kristen ITC was not suitable as a dominant font throughout the text. The font sizes were also chosen according to accessibility standards. CNIB sets clear accessibility standards for print materials to support individuals with vision loss. In order to make print “as clear and readable as possible” (it is presumed that the CNIB means legible, rather than readable) the CNIB recommends the following: high contrast should be used between the text and the background, ideally black text on a white background (4-6); point size should be kept large, ideally between 12 and 18 points (8); fonts should be a

medium heaviness and avoid thin type such as italics (14); and design should be kept clean and simple (22). In terms of design simplicity, CNIB specifically recommends one “use distinctive colors, sizes and shapes on the covers of materials to make them easier to tell apart” (22). Additionally, the guide recommends that one “avoid complicated or decorative fonts” and “choose standard fonts with easily recognizable upper and lowercase characters” (12). CNIB suggests that Arial or Verdana would be a suitable font choice (12), which are sans serif fonts.

In line with the CNIB guidelines, Candara, the font used for the body text, is a sans serif font. It includes easily recognizable upper and lowercase characters and is not excessively decorative. The cover page also follows CNIB guidelines to be use distinctive sizes and shapes, as the cover page has the largest owl image out of the entire pamphlet, and it uses a distinctive title font not used elsewhere in the pamphlet. The body text on the zine is size 12, the headings are a size 16, and the title is a size 18 points font. As such, all texts on the zine fall within CNIB’s size guidelines. Additionally, italics are not used in the zone to avoid thin, illegible lines. Lastly, most text in the zine is black with a white background for high contrast. In the few instances where text does not have a white background, it has a very light blue background to achieve as much contrast as possible.

Of course, a perfect model of accessibility would look towards an auditory version of this document, a braille version, alternate languages and so forth. Future versions of this project may look into these opportunities for accessibility and inclusion, but at present this project must acknowledge that “inclusion is imperfect and requires humility” and treat inclusion as “an opportunity to learn” (Holmes 9). Additionally, this project follows a key tenet of Value Sensitive Design and makes commitment to progress, not perfection (Friedman and Hendry 17).

### **Designing for Cultural Tensions**

Why are the owl's eyes covered on the back panel? In indigenous Mesoamerica, owls have for centuries been the traditional omens of death (Gargaraza 457; Robillard et al 8-10; Lake-Thom 116). While these deaths were often attributed to the hoot of the owl (Gargaraza 456-7; Lake-Thom 116), the gaze of the owl is also problematic according to the teaching called "Owl's Warrior Medicine" as described by Lake-Thom. In this teaching, the Bird People were being terrorized by a sorcerer who wanted to imitate the creator. In doing so, he created the owl who would torment the Bird People by interrupting their vision quests and stating, "Look at my eyes; see how strange they are, but how much power I have in them" (117). The Bird People then prayed to the Creator and to which he answered, "beware if you see an owl look at you and holler at you in broad daylight because it is really death himself that is stalking you" (Lake-Thom 117-118). In this teaching, the owl's eyes are a part of its power. Therefore, in order to diminish the potency of the owl as a bad omen, its eyes and call must also be diminished. One technique used for diminishing the potency of the owl is to blur out their eyes. This is seen in season two of the TV show *Reservation Dogs*, which was written and directed by a largely indigenous team about the indigenous experience in North America (Boutsalis). As such, the technique of covering the owl's eyes is borrowed from this show as a means of diminishing the potency of an owl icon and to acknowledge how the owl iconography may impact members of indigenous communities. This zine burrows from *Reservation Dogs* by obscuring the owl's eyes with a black bar and encouraging people to display the zine backwards to support indigenous audience members. This way, indigenous person's will be less likely to come across owl eye iconography unexpectedly and experience undue stress. Of course, from the indigenous perspective it would be most effective to cover all of the owl eyes in the pamphlet or to omit the owls entirely. However, in a pamphlet about the burrowing owl this would then limit the ability

the zine has to affect broader audiences. We have found here a cultural tension and, in turn, a value tension that has been challenging to account for.

### **Technical Constraints**

As previously mentioned, certain elements of the design were constrained by the printing technology being used. The risograph printer used by ASU had very specific printing requirements due to its unique screen-style print technology. As such, the printer could only use up to three ink colors, not including black ink. Similarly, there were a limited set of ink colors, and a more minimalistic use of ink was recommended to avoid pages sticking together or jamming the printer. For example, a lower opacity was recommended for certain colors, and it was generally recommended that white space be welcomed into the project. Additionally, the risograph shaped the ways in which the file was constructed. Each image had to be separated out into colour layers. For example, every part of every image that was being printed in yellow ink had to be on the same photoshop layer and every part of every image that was being printed in black ink (at any opacity level) had to be stored on another layer. All of this information was kindly provided by Daniella Napolitano, who works as a print instructor at ASU.

This affected the design in a few ways. Firstly, the palette was changed to align with the available inks, namely the blue changed from a sky blue to a navy blue. Secondly, text was generally not printed on top of other sections of high or low opacity ink, this was another suggestion from Daniella. She highlighted that such designs often resulted in smudged ink, stuck pages, and misalignments. Misalignments can be particularly troublesome as each colour layer is printed individually, and therefore if the paper shifts slightly or gets stuck the prints can overlap in problematic and unreadable ways. Overall, Daniella's suggestions improved the printability of

the design and also improved the readability and accessibility, many of her suggestions also helped to bring the design in-line with CNIB's printing guidelines.

### **Biography of the Designer and Acknowledgements**

In order to be faithful to the intents of this project, to think relationally, and to acknowledge the agentic qualities of both human and non-human actors in the development of this project, it feels critical to turn towards Wakkary's notion of the designer as biography. In essence, Wakkary considers a designer in its most basic form to be "an interconnected human-thing" (174). That is, the designer is deeply connected to the non-human involved in the project. In this way, the designer becomes an assemblage of all the stakeholders in a design project. As such, it is critical to include in this project an actual (if brief) account and acknowledgement of those involved in the development of this project and who should be understood as co-designers. First, there are the burrowing owls themselves. There has also been the myriad of individual human stakeholders including, Greg Clark; Heather Bateman; Adam C. Stein; Andrew Mara and his UX Design class; Alejandro Acierito and his ASU Arts class; Dr. Marcel O'Gorman; Dr. Jennifer Clary-Lemon; Chris Rogers; Sophie Morgan; Daniella Napolitano; and Jason Bruner. Several organizations and institutions have shaped this project as well, including Wild at Heart, Arizona State University, The Desert Humanities, The Critical Media Lab, and the ASU Institute for Humanities Research.

The land in the Phoenix Arizona area, such as South Mountain Park and Papago park must be accounted for as well. These places shaped my understanding of the landscape in Phoenix. The various artificial burrow sites such as Estrella Mountain Community College, Arizona State University Polytechnic and West Campuses, and the Maricopa site, each informed my understanding of Wild at Heart's burrowing owl translocation project and what life might be

like as a burrowing owl. We must also consider the other non-human, animal stakeholders that the Waterloo research team encountered, such as coyotes, ground squirrels, and various songbirds, as well as the ones we did not encounter during our time in Arizona, such as mice, badgers, prairie dogs, rattle snakes, great horned owls and so forth.

All direct and indirect stakeholders above have shaped the design of the project in some way, whether by contributing new information, making suggestions for content and design elements, shaping my understanding of key concepts and so forth. In this sense, each stakeholder should be considered as a co-designer alongside myself as “the human designer, like all other humans, is relational, meaning interconnected and interdependent with things and the larger assemblies that form. This is important as it signals that the human aspect of the designer cannot “act independently of its nonhumanness” (Wakkary 176). Rather, this project is not a product of my work alone. I am just the one who wrote it all down. I have written this biography as a means of documenting my co-designers and as a means to proceed with humility (Wakkary 184), as Wakkary argues designers must in order to design in a Posthumanist manner.

## CONCLUSION

Ultimately, we must learn to “become-with each other or not at all” (Haraway 4), rather we must learn to think, live, and design relationally if we are to continue to survive on this planet that we have damaged. Posthumanist design proposes the decentering of humans in thought and design process, so that we learn to share “centre stage with non-humans” (Wakkary 5). We must learn to undo the humanistic thought processes that lead us into the destructive nature of the Anthropocene. However, to rewrite one’s thought processes or to rewrite such a humanistic discipline as design is a complex process. While it matters what “thoughts think thoughts” (Haraway 12), as in how we use posthumanism to rethink design theory, it also matters *what*

*methods* we use to design, and it matters *who* we choose to design-with. In essence, “it matters what knot knots knots” (Haraway 12). It matters who we seek connections with and how we seek out those connections. As such, while methods such as Haraway’s fabulations, Braidotti’s figurations, and Wakkary’s biographies begin to show us the way forward, there is still room for improvement. Designers need a framework and methods through which they can identify a broad range of stakeholders early in the design process and identify points of connection between stakeholders early on in the design process. In this way, designers are able to interrogate their biases for and against certain stakeholders. The methods in Friedman and Hendry’s Value Sensitive Design offer methods by which designers can achieve these goals in the design process. Direct and Indirect Stakeholder Analysis allows designers to identify a broad range of stakeholders, because it encourages designers to think broadly about the possible and diffuse effects of a design project. An ethnographic enquiry into values and technology allows designers to interrogate the values held by each stakeholder as they relate to the project. In this way, designers are able to conceptualize the various relationalities between stakeholder and project as well as stakeholder and stakeholder. Moreover, by critically evaluating the shared values of stakeholders, designers have the opportunity to recognize and interrogate any biases they may hold for specific stakeholders.

Alternatively, consolidating the information gathered during these methods into a values map allows designers to further visualize the connections, tensions, and commonalities between stakeholders. In the terms of this project, all stakeholders shared the value of survival. A values map doesn’t ask one to erase conflicts, but instead work with them. Additionally, this practice requires that one sit and think through what may be important to a stakeholder. In order for Posthumanist design to be effective, it must be done with empathy and humility. Moreover,

values maps, much like Wakkary's biographies, require that the designer account for and document all the stakeholders included in the design process. It helps to make visible which stakeholders may be privileged over others in projects. Most importantly, these methods foster a space and means of thinking relationally and broadly about stakeholders. Value Sensitive Design provides methods by which designers can inform their figurations, fabulations, constituencies, and biographies. By thinking through our relationships to non-human stakeholders within design projects, we can begin to become-with non-humans and take our first steps to a livable future on this damaged planet.

## References

- Alberta. *Alberta Environment and Sustainable Resource Development*. Alberta Recovery Strategy for Burrowing Owls 2012-2017. Edmonton: Oct. 2012. PDF.
- Barclay, John H. "A Simple Artificial Burrow Design for Burrowing Owls." *Journal of Raptor Research*, vol. 42, no. 1, 2008, pp. 53-57. doi.org/10.3356/JRR-06-85.1
- Boutsalis, Kelly. "This Is What We Should Have Had All Along". The New York Times, 9 August 2021. <https://www.nytimes.com/2021/08/09/arts/television/reservation-dogs-rutherford-falls.html>. Accessed 4 July 2023.
- Braidotti, Rosi. *Posthuman Feminism*. Polity, 2022.
- CNIB Foundation. "Clear Print Accessibility Guidelines". *Accessibility at CNIB*, n.d., PDF.
- Dunne, Anthony and Fiona Raby. "Chapter 3: Design as Critique". *Speculative Everything: Design, Fiction, and Social Dreaming*, MIT Press, 2013, pp. 33-46.
- Ehlers, Eckart, and Thomas Krafft. *Earth System Science in the Anthropocene*. Springer Berlin Heidelberg, 2006, DOI: <https://doi.org/10.1007/b137853>.
- Escobar, Arturo. *Designs for the Pluriverse : Radical Interdependence, Autonomy, and the Making of Worlds*. Duke University Press, 2018, <https://doi.org/10.1515/9780822371816>.
- Friedman, Batya and Hendry, David G. *Value Sensitive Design: Shaping Technology with Moral Imagination*, MIT Press, 2019. Book.
- Garagarza, León García. "The Tecolotl and the Chiquatli: Omens of Death and Transspecies Dialogues in the Aztec World". *Ethnohistory*, 2020, vol. 67, no. 3, p. 455-479.

Haraway, Donna J. *Staying with the trouble: Making Kin in the Chthulucene*, Duke University Press, 2016. Book.

Holmes, Kat. *Mismatch: How Inclusion Shapes Design*. The MIT Press, 2018.

Johnson, D.H., D.C. Gillis, M.A. Gregg, J.L.Rebholz, J.L. Lincer, and J.R. Belthoff.. “Users Guide to Installation of Artificial Burrows for Burrowing Owls”, Tree Top Inc., 2010.  
URL: <https://wdfw.wa.gov/sites/default/files/publications/01199/wdfw01199.pdf>. PDF.

Lake-Thom, Robert. *Spirits of the Earth: A Guide to Native American Nature Symbols, Stories, and Ceremonies*. 1997, Penguin.

Lewis, Simon L. and Mark A. Maslin. “Defining the Anthropocene”, *Nature*, 2015, Vol. 519, no. 7542, pp. 171–180. DOI: <http://dx.doi.org.proxy.lib.uwaterloo.ca/10.1038/nature14258>. PDF.

Lincer, J.L. and P. W. Bloom. “The Status of the Burrowing Owl (*Athene cunicularia*).” *The California Burrowing Owl Symposium*, 11 November 2003, San Diego County, California. Guest Lecture.

Malpass, Matt. “Introducing Critical Design”. *Critical Design in Context: History, Theory, and Practice*, Bloomsbury Academic, 2017, pp. 1-16

----- “Theories, Methods, and Tactics”. *Critical Design in Context: History, Theory, and Practice*, Bloomsbury Academic, 2017, pp. 41-70

O’Connor, Zena. “Traditional Colour Theory: A Review.” *Color Research and Application*, vol. 46, no. 4, 2021, pp. 838–47, <https://doi.org/10.1002/col.22609>.

Sheffield, Steven R. “Current status, distribution, and conservation of the Burrowing Owl

(*Speotyto cunicularia*) in midwestern and western North America”. *U.S. Department of Agriculture: Forest Service*. 1997. PDF.

Robillard, Stephanie M. et al. “When is an Owl More Than an Owl? An interaction Analysis of a Computer Science Co-Design Convention on Cultural Relevance”. *International Society of the Learning Sciences*. 2023, p. 1-10

Wakkary, Ron. *Things We Could Design for more than Human-Centred Worlds*, MIT Press, 2021. Book.

White, Alex. *Elements of Graphic Design* . Skyhorse Publishing , 2011. PDF.

Wolfe, Cary. *Art and Posthumanism: Essays, Encounters, Conversations*. University of Minnesota Press, 2021.

Wolfe, Cary., and W. J. T. Mitchell. *Animal Rites American Culture, the Discourse of Species, and Posthumanist Theory*. University of Chicago Press, 2003,  
<https://doi.org/10.7208/9780226905129>.