Sight and Sound: Counter-mapping the U.S.-Mexico Border Crisis

Lacey Schauwecker <lschauwe_at_usc_dot_edu>, University of Southern California

Abstract

Jason De León's Undocumented Migration Project and Valeria Luiselli's *Lost Children Archive* are two archival studies of the U.S.-Mexico border crisis that challenge hegemonic practices of documentation, including those historically privileged by the U.S. Department of Homeland Security, human rights activism, and the field of digital humanities alike. Though De León and Luiselli have participated in human rights work while identifying migrant corpses and collecting detainees' testimonies, both use counter-mapping to interrogate the dominant humanitarian move of restoring visibility and voice, or sight and sound, to human victims. After investigating the ways in which De León and Luiselli privilege visual and sonic counter-mapping, respectively, I model a more multi-sensory counter-mapping practice. Though this practice remains far from perfect, I argue that such digital counter-mapping crosses sight and sound in ways that defy historical divisions among humans and nonhumans. Accordingly, it decenters humans as the sole victims of the U.S.-Mexico border crisis.

I. Introduction

The field of digital humanities defines itself by a capacity for interrogating and innovating the traditional humanities. More than a mere transference from material to analog to digital, this field claims to function as a "subversive force" with its own creations and challenges [Hayles 2012]. Distinguishing digital humanities as not better or worse, but different, from its predecessor, N. Katherine Hayles states that such "differences can leverage traditional assumptions so they become visible and hence available for rethinking" [Hayles 2012]. Yet, this very assertion demonstrates one of the field's central challenges, for Hayles here replicates an age-old assumption that something must first "become visible" for it then to be "available for rethinking." Multiple digital humanities scholars have acknowledged the field's difficulty in defying such visual hegemony or, stated otherwise, interrogating and innovating vision as itself historically dominant.

Observing that "the digital humanities is today overwhelmingly visual," Sari Altschuler and David Weimer claim this imbalance to "have inadvertently exacerbated a tendency to privilege sight as the sense through which knowledge is accessible" [Altschuler 2020]. Such privileging largely results from the Scientific Revolution and subsequent Age of Enlightenment. With the development of seeing and printing technologies in the 15th and 16th centuries, visual mapping and charting assumed central roles in understanding the world on small and large scales. In *Hypercities: Thick Mapping in the Digital Humanities*, Todd Samuel Presner, David Shepard, Yoh Kawano note such mapping to have been critically involved in the establishment and expansion of European nation-states, including colonial conquest [Presner 2014]. Yet while mapping never has been, and never will be, a neutral representation of knowledge, many scholars celebrate the shift to digital mapping as a potentially more multi-sensory and malleable practice.

According to Clancy Wilmott, digital mapping has upended "the assumption that 'the map' is a static representational object" [Cooper 2016]. More than artifactual maps made with permanent ink and parchment, "the map" now commonly functions less as an object and more as a dynamic, interactive process. Such functionality is inevitably transformational, if not exactly subversive, prompting the skeptical attention of humanities and digital humanities scholars alike. In *Literary Mapping in the Digital Age*, David Cooper, Christopher Donaldson, and Patricia Murrieta-Flores emphasize the need to evaluate "how the process of digital mapping and map-making alters the way we perceive and engage with the geographies that surround us" [Cooper 2016]. Such evaluation interrogates what digital mapping reveals, conceals, and

remains unable to convey, perhaps facilitating "new spatial practices and spatial imaginings."

In this article, I engage debates on critical cartography with particular attention to how digital mapping influences humans' understandings of landscape, as well as themselves. Specifically, I investigate the subversive potential of digital mapping the Sonoran Desert in the context of an ongoing U.S.-Mexico border crisis, where hegemonic practices of seeing, knowing, and surveilling continue to shore up colonization and its violent legacy. As U.S. border militarization implicates, and intentionally disappears, multitudes of humans and nonhumans each year, questions of mapping preoccupy government agencies, international corporations, on-the-ground activists, and interdisciplinary scholars alike. In what follows, I join multiple humanities and digital humanities scholars in thinking about the possibility of mapping the unmappable, including that which remains invisible by design. Additionally, I ask, "How might such counter-mapping facilitate a rethinking of the U.S.-Mexico border crisis, beyond anthropocentrism?"

To address these questions, I first provide historical and theoretical background on the necessity, as well as difficulty, of mapping and counter-mapping this region. Next, I analyze two well-known examples of counter-mapping, namely Jason De León's Undocumented Migration Project and Valeria Luiselli's *Lost Children Archive*. After investigating the ways in which De León and Luiselli privilege visual and sonic counter-mapping, respectively, I model a more multi-sensory counter-mapping practice. Though this practice remains far from perfect, I argue that such digital counter-mapping crosses sight and sound in ways that challenge historical divisions among humans and nonhumans. Accordingly, it decenters humans as the sole, and most important, victims of the U.S.-Mexico border crisis.

II. Mapping and Counter-mapping

I focus on the Arizona-Sonora region of the U.S.-Mexico border: home to Apache, Hopi, Maricopa, Mayo, Pima, Navajo, Yaqui, Hohokam, and Tohono O'odham peoples, as well as exceptionally biodiverse mountain regions known as sky islands.[1] Throughout the arrival of Spanish missionaries in the early 18th century, the Mexican-American War (1846-47), the Gadsden Purchase (1854), and the Apache Wars (1849-1924), indigenous and colonial settler populations violently negotiated and renegotiated control of these borderlands. After the annexation of U.S. territories including Texas, New Mexico, Arizona, and Southern California from Mexico in the mid-1800s, migration northward was incentivized or illegalized depending on the U.S.' political and economic need.[2] Still, enforcement remained relatively lax until the "Border Patrol Strategic Plan of 1994 and Beyond," which heightened the militarization of the border through increasingly brutal uses of land and surveillance technology. Since its implementation, such policy has resulted in 7,000 to 8,000 migrants dying while crossing Southern Arizona [Colibrí 2020][3]. By design, many of these deaths remain unidentifiable, if not altogether invisible. In turn, mapping practices in this area now indicate not just who wins the war and owns the land, but what life remains in this undeclared killing zone.

Currently, the only map on the U.S. Department of Homeland Security's website is that of its "Border Wall System," depicted in Figure 1.

Please click and zoom on the map to see more information about the Border Wall System
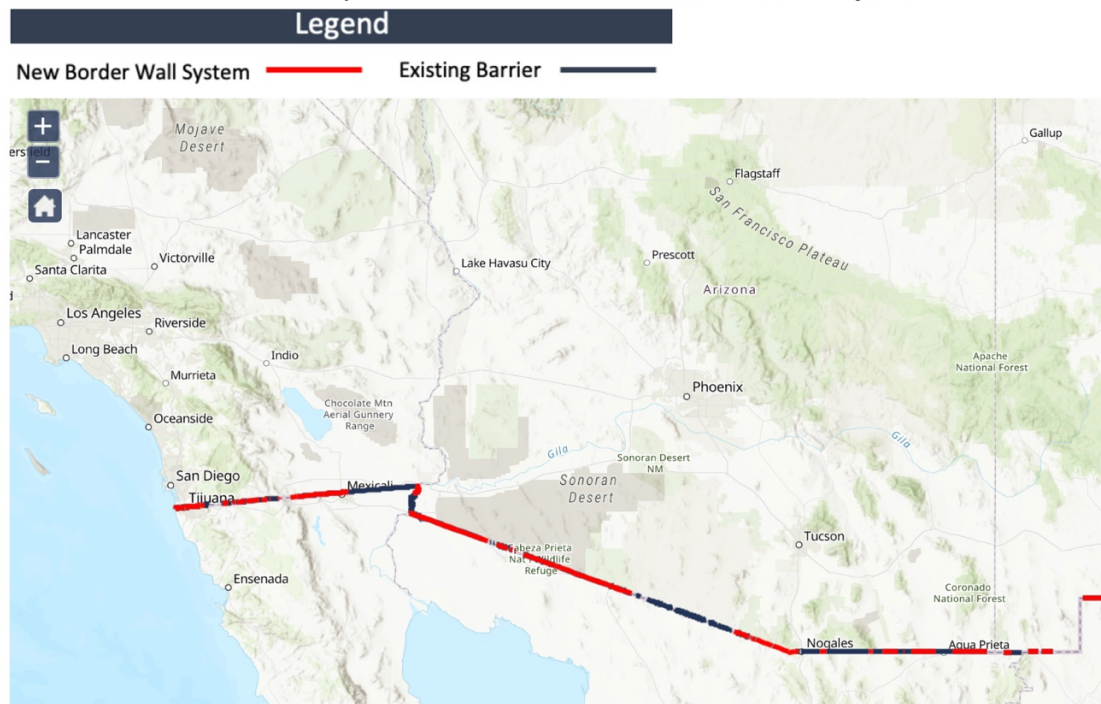
Figure 1. U.S. Department of Homeland Security's digital map of its "Border Wall System"

Looking at this digital ArcGIS map with a thick, but noticeably partial, line along the U.S.-Mexico border, viewers can click on highlighted parts of the line for more information about ongoing wall construction and associated photos [U.S. Customs 2020]. However, those interested in other forms of "border security" need to look elsewhere for data on drone technology, scope stations, and ArcGIS live monitoring software. Knowledge of this largely invisible surveillance system exposes border wall-building as mere spectacle, for DHS policy is not designed to prevent migration per se, but rather to ensure its profitability. Instead of stopping migrants from crossing at all, for example, Prevention Through Deterrence intentionally pushes migrants out into the remote and dangerous desert, where they are more likely to die or, alternatively, to be apprehended, detained, and eventually deported. On its website, however, DHS misrepresents itself as benign, wall-building protector, and the Sonoran Desert as brutal murderer.

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Given the high stakes of mapping in this and other areas of conflict, scholars and activists have employed varied practices of counter-mapping. Coined by sociologist Nancy Peluso, the term "counter-mapping" refers to processes in which communities appropriate and repurpose institutional techniques of map-making in order to create alternatives to hegemonic representations [Peluso 1995]. Anthropologist Jason De León, who has studied migration and violence in Southern Arizona since 2009, draws on fellow migration scholar Martina Tazzioli's elaboration of counter-mapping as having two specific purposes of 1) making visible the effects of authority and 2) challenging the very possibility of mapping these effects [Tazzioli 2015]. This definition is notable for exhibiting a tension similar to that of digital humanities insofar as it simultaneously relies on and resists "making visible" as a principal source of knowledge.

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Like Hayles, Tazzioli here implies that she intends to rethink the very concepts to which she appeals, including visibility and mapping. Noting the humanities and digital humanities' dominant reliance on visual and textual methods, multiple scholars have recently turned to sound and listening as part of a heretofore neglected epistemology. For example, Mary Caton Lingold, Darren Mueller, and Whitney Trettien, editors of *Digital Sound Studies*, wonder what forms of knowledge and embodied experience are going unheard in the digital turn [Lingold 2018]. Turning to sound as an under-utilized mode of study within digital humanities, this collection challenges not just the hierarchization of senses, but also their very separation. Since this separation emerged over time, as part of Enlightenment thinking, sound studies scholars such as Jonathan Sterne and Michael J. Kramer claim we can use the "flexible modularity" of digital data to both understand and reverse this history [Lingold 2018].

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As I will elaborate in my study of counter-mapping the U.S.-Mexico border crisis, undoing this separation of senses can also challenge the historical division of nation-states and species. For while much discussion of counter-mapping emphasizes the visualization of space, and even De León claims his work to "foster alternative forms of understanding, visualizing, and producing *space*," I read his work as especially important for the ways in which it sets up a rethinking of the Sonoran Desert as a space of invisible and indiscriminate violence. In *Lost Children Archive*, a novel that also studies migration and disappearance in Southern Arizona, Valeria Luiselli furthers such rethinking by privileging sound as a mode of knowledge with counter-mapping capabilities. Reading these scholars' work together exposes the stakes of counter-mapping to be not simply a rethinking of sight and sound as they relate to space, but also as they relate to the humans *and* nonhumans traversing such space. In other words, the stakes are ways of witnessing the U.S.-Mexico border crisis that decenter visuality and anthropocentrism simultaneously.

III. Visual Counter-mapping

The similarities between Jason De León's *The Land of Open Graves* (2015), his first book about the Undocumented Migration Project, and Valeria Luiselli's *Lost Children Archive* (2019) become more obvious upon considering the latter's translated title, *El Desierto Sonoro* (2020).[4] Both books are about the Arizona desert, and principally the Sonoran Desert, which is a biodiverse region covering large parts of the Southwestern United States and Northwestern Mexico. More specifically, these books are about the many thousands of migrants that have attempted to cross this dangerous landscape, especially since the Department of Homeland Security's implementation of its "Prevention Through Deterrence" policy, part of the aforementioned "Border Patrol Strategic Plan of 1994 and Beyond." Entailing heightened militarization and surveillance in urban sections of the border such as San Diego, California and Nogales, Arizona, this policy intentionally pushes traveling migrants into rural areas that increase their chances of turning themselves in, getting lost, or dying. Since the early 2000s, the Pima County Office of the Medical Examiner has reported doing upwards of 150 autopsies on undocumented border corpses annually [Continued 2013]. Furthermore, Dr. Gregory Hess, Pima County's current Chief Medical Examiner, estimates that these self-disclosed numbers likely represent just 1/3 of actual migrant deaths in this area [Hess 2019].

As De León's title indicates, this terrain is truly a land of open graves. Yet, the desert's intense heat, strong wind, and flash floods quickly decompose and disperse migrant bodies, making finding and identifying them still difficult. De León, both an archaeologist and anthropologist by training, started the Undocumented Migration Project in 2009 in order to better understand the causes, as well as physical experiences, of undocumented border crossing [De León 2015]. Using ethnographic, archaeological, forensic, and visual anthropological methods to collect evidence of such crossing, De León distinguishes his interdisciplinary work as taking "sideways glances" that "foster new ways of thinking about border crossings and the routinized pain and suffering that accompany them" (17). These sideways glances, a concept originally proposed by Slavoj Žižek in *Violence: Six Sideways Reflections*, entail zooming out beyond a mere focus on the human subjects of violence in order to think more broadly and critically about the structural causes of such violence [De León 2015]. For De León, this means witnessing what remains otherwise overlooked, including the socioeconomic factors that cause migrants to leave their homelands, as well as those that have made their journey increasingly dangerous.

In *The Land of Open Graves*, such witnessing involves both narrating and counter-mapping in ways that put pressure on hegemonic forms of documentation, principally those of the U.S. Department of Homeland Security, but sometimes also those of fellow human rights activists. Acknowledging the graphic nature of his work, for example, De León recounts instances in which critics have claimed his photos of decayed migrant corpses to rob their subjects of human dignity. His refusal to instead make migrant bodies visible as whole and uninjured is striking for its refusal to rehumanize such victims, as many human rights archives and organizations profess to do.[5] In his words, "The deaths that migrants experience in the Sonoran Desert are *anything* but dignified. *That* is the point" [De León 2015, emphasis added]. For De León, such dehumanization, both in life and in death, is the precise point of policies including Prevention Through Deterrence. Identifying such decomposition as a form of structural, postmortem violence, he elaborates that the seeming "natural" processes of dying and decaying in the desert are actually "political facts representative of the value placed on the lives and deaths of undocumented people" [De León 2015].

These claims are noteworthy for their simultaneous reliance upon and rejection of Enlightenment-based practices of seeing, knowing, and valorizing the human. For while De León does privilege visual and material evidence, he also stubbornly casts his glance askew of the very subjectivity, or indeed humanity, associated with such epistemology. This move corresponds with Elizabeth Anker's critique of how Enlightenment-based notions of the human body and mind still inform dominant notions of humanitarianism and human rights activism. As she observes, these discourses predicate human dignity on corporeal integrity; for an individual to be a human worthy of rights, they must first have a body that is "whole, autonomous, and self-enclosed" [Anker 2012]. This is because, according to Enlightenment-based liberalism, only this type of body meets related ideals, such as reason, conscience, and freedom. Yet Anker points out that this idealized human body and subject is paradoxically "decorporealized," for it negates core dimensions of embodied experience, including "vulnerability" and "decay" [Anker 2012].

When De León foregrounds migrants' partially decayed corpses as "*anything* but dignified," he likewise acknowledges and critiques hegemonic standards of human rights subjectivity. Making visible a commonly overlooked reality, his photos are graphic reminders of the human body's limits: the very limits that leave it susceptible to both violence *and* ignorance. If bodies are not whole, they also cannot see whole pictures, or know whole stories. Yet, denying these limits in the name of human dignity is one way humans separate themselves as physically and mentally superior to other animals [Anker 2012]. In this sense, De León's images challenge visuality and anthropocentrism simultaneously, serving his noted interest in "troubling human-nonhuman binaries" [De León 2015]. Furthermore, they help show how "structural agency" both commits and conceals violence in the U.S.-Mexico borderlands.

According to De León's counter-mapping research with the Undocumented Migration Project, such structural agency involves the dehumanization of humans, as well as the humanization, or "denaturalization," of nonhumans such as the Arizona desert. Prevention Through Deterrence, which is just one policy, for example, involves human, technological, geographical, animal, mineral, and meteorological actants. Drawing on Michel Callon and John Law's theory of "hybrid collectif," which identifies agency as a property that emerges from the interaction of various heterogeneous actants, De León refers to this combination of human and nonhuman agents involved in the U.S.-Mexico border crisis as the "Sonoran Desert hybrid collectif." To fully account for this collectif, De León stresses the need to abandon dualist thinking, including that which relies on simplistic human-nonhuman binaries. On one hand, he wants to expose how the U.S. Department of Homeland Security "can draw on the agency of animals and other nonhumans to do its dirty work while simultaneously absolving itself of any blame connected to migrant injuries or loss of life" [De León 2015]. Yet, on the other hand, he is careful of falling back into an anthropocentrism that myopically frames humans as the only perpetrators, as well as victims, involved in this complex crime scene.

In his counter-mapping work, De León often draws on data from the Arizona OpenGIS Initiative for Deceased Migrants map, which is represented here in Figure 2 and is the result of an ongoing partnership between the Pima County Office of the Medical Examiner and Humane Borders, Inc.
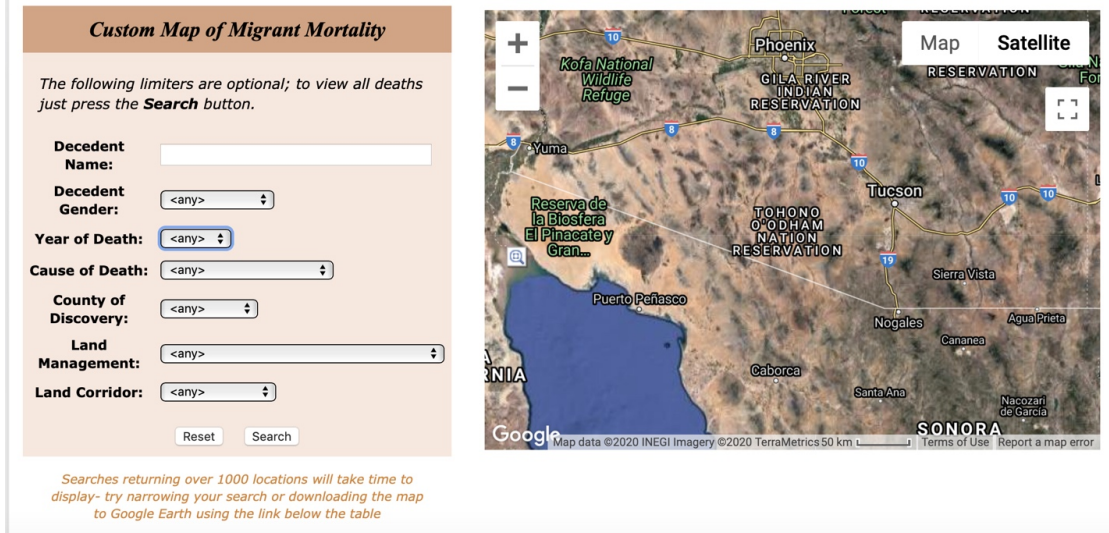
Figure 2. Arizona OpenGIS Initiative for Deceased Migrants map

A counter-map in its own right, this map challenges hegemonic representations of the U.S.-Mexico border crisis by repurposing geographic information system (GIS) software similar to that which DHS uses in conjunction with remote sensors, lookout towers, and agent-carried GPS units [De León 2016].[6] For DHS, these technologies provide immediate information on suspected migrant activity in remote areas that appear otherwise unsurveilled, or simply "natural" [De León 2016]. In contrast, the Deceased Migrants map implements GIS software with the mission of raising awareness about the entirely unnatural quantity of migrant deaths in the Arizona desert and, when possible, also identifying the deceased so that remains may be returned to families. Accordingly, the map charts the locations of found corpses, as well as related information such as postmortem interval, body condition, cause of death and — if identifiable — name, sex, and age [Arizona OpenGIS]. A dynamic digital map with numerous search functions, it also allows searches by migrant name, land corridor, and year of death.

As a viewer who repurposes these GIS tools and information once more, De León foregrounds not only human victims' suffering, but also the hybrid collectif implicated in it. In "Scales of Suffering in the US-Mexico Borderlands," an article published after *The Land of Open Graves* and with anthropologist co-authors Cameron Gokee and Haeden Stewart, De León plots migrant deaths and belongings against multiple representations of the Sonoran Desert, specifically the Nogales-Sasabe corridor. The Undocumented Migration Project's expansive archive of discarded objects includes intimate items such as bibles, love letters, and photos, as well as practical items such as backpacks, water bottles, and shoes. Here, De León specifically plots aid-related artifacts against geography models, showing how the use of bandages, anti-infectives, and analgesics corresponds to changing contours of the terrain. Figure 3 depicts a map of aid-related artifacts and associated land covers documented in the Nogales-Sasabe corridor by the Undocumented Migration Project from 2009-2013 [Gokee 2020].
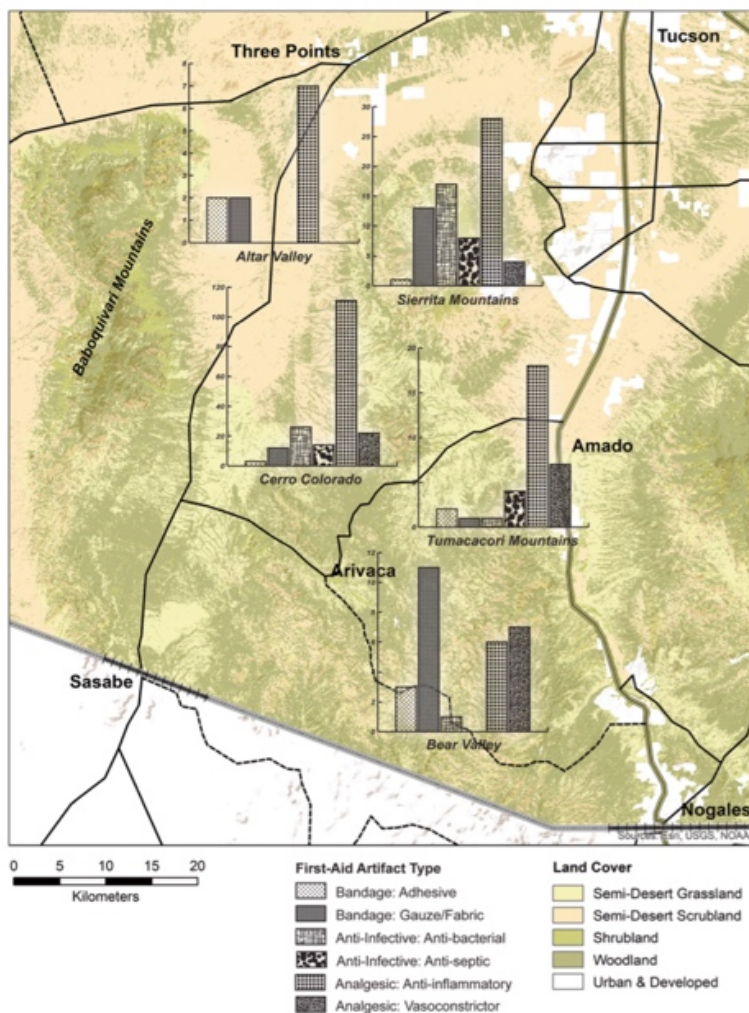
Figure 3. Aid-related artifacts and associated land covers documented in the Nogales-Sasabe corridor by the Undocumented Migration Project from 2009-2013 [Gokee 2020]

Especially in cases where migrant corpses have decomposed to the point of complete destruction, discarded belongings function as the only clues to one's demise out in the remote desert. Therefore, De León and his co-authors view these "scales of analysis" as able "to let the suffering of migrants 'speak' in different ways": ways that expose humans' victimization and the desert's weaponization simultaneously [Gokee 2020].

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When counter-mapping, De León is forthright about the "seemingly paradoxical attempt to use spatial data and spatial analysis to critique and undermine spatial data and spatial analysis" [De León 2016]. While DHS employs private mapping and analytics software, such as Esri's ArcGIS, De León draws from the Arizona OpenGIS Initiative for Deceased Migrants map, which uses open source software to make data readily available. Yet, this information on migrants' deaths could simultaneously serve as valuable data on the efficacy of border enforcement, and how to strengthen it. Given this possibility, De León elsewhere notes a resistance to publishing such data and touches on a central debate in digital humanities about the possibility of dismantling the master's house with the master's tools [De León 2016]. Analyzing the risks of using GIS software that produces data, as well as money, for ethically dubious companies, Safiya Noble advises the public to stay vigilant of how such software further entrenches them in the very systems they may be critiquing [Noble 2011]. Since Noble also notes how these same GIS technologies often help improve communities, she urges critical yet creative applications. Yet, I contend that part of De León's conundrum is his maps' reliance on not just the same GIS tools, but also the same visual media and human categories, that are readily recognizable to DHS.

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For this reason, I am most interested in where and how De León also repurposes the master's tools beyond the point of

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easy recognition. Though he views his counter-maps as able to let the suffering of migrants "speak," he claims "they also contain their own silences and elisions" [Gokee 2020]. Here, De León notably switches from framing his work as predominantly visual to also vocal in order to point out how it is only partially revelatory. Yet, he elaborates on his maps' incapacity to represent everything in every way as "critical to countering the scalar projects, including maps, that obscure decades of migrant suffering at the hands of PTD [Prevention Through Deterrence] policies along the US-Mexico border" [Gokee 2020]. In this sense, such silences are part of his maps' functionality, not flaws. In fact, they also "speak," as they further expose the ways in which migrants have been intentionally disappeared, both in life and death.

At the same time, such silences remain absolute insofar as they represent absence: the absence of a body, testimony, identifiable human subject. Throughout the humanities and digital humanities, multiple scholars continue to grapple with how to account for such absence, which is endemic to archives about systemic violence and erasure. Thinking specifically about the archive of American slavery, Lauren Klein notes how the silences of slaves expose a "true" archive that "encompasses impossibility," including the impossibility of knowing [Klein 2013]. Against Enlightenment-based epistemological biases that elevate "what is observable to the status of fact," Klein values the archive as a tool for exposing the limits of our knowledge, limits that even digital methods such as data visualization fail to surpass [Klein 2013]. In failing, however, they force us to think about other ways of seeing and knowing, such as speaking and listening. While De León's work briefly mentions these possibilities, I now turn to Valeria Luiselli's *Lost Children Archive* as a counter-mapping model that instead privileges the auditory. Such an approach, I argue, enables her to further challenge epistemological biases and human/nonhuman binaries. [24]

IV. Sonic Counter-mapping

Contrary to De León's appeal to visual and material evidence in the form of migrant bodies and their belongings, Luiselli's *Lost Children Archive* centralizes a lack of such evidence. Or, rather, the uncertainty of all evidence. The mother-protagonist, a radio journalist by profession, is never quite sure of what she sees or hears, making her story largely about the impossibility of narration, as well as traditional mapping. At first, she helps record child migrants' oral testimonies in the New York immigration court, where she volunteers as a translator [Luiselli 2019a]. But when her husband insists on going westward to record auditory echoes of the Apache, who were disappeared in the Sonoran Desert long before the current U.S.-Mexico border crisis, she begins adjusting her own work to be able to accompany him. As she proceeds to research, "slowly build an archive," and extend her focus on the child refugee crisis to "the southern borderlands," the book becomes about her process of trying to connect multiple ideas, images, voices, and lack thereof into a new project. [25]

Explaining the archival nature of this novel, Luiselli distinguishes its "textual, musical, visual, and audio-visual" references as central "voices in the conversation that the book sustains with the past" [Luiselli 2019a]. In addition to history, *Lost Children Archive* engages the fields of law, anthropology, cartography, and acoustics, among others. As a result, one can read Luiselli's book as a specific type of interdisciplinary archive: a sound map. Encouraging interdisciplinarity and experimentation within archival studies, Marlene Marnoff claims that "thinking through making" is key to finding new ways of "interrogating archival silence" [Foscarini 2016]. In *Lost Children Archive,* the mother-protagonist specifically practices a thinking through listening and mapping, as she continually tries to chart the sounds and spaces that both envelop and elude her. Lacking a visual and digital interface, such counter-mapping requires readers to likewise navigate the Sonoran Desert through her ears, a methodology that often conflates present and absent, as well as human and nonhuman, subjects. [26]

While *Lost Children Archive* does publish images of multiple visual, and in this sense hegemonic, maps, it also consistently calls such maps into question. For example, the mother-protagonist's archive includes a version of the very Arizona OpenGIS Initiative for Deceased Migrants map that De León draws upon. Depicted in Figure 4, this particular version charts migrant deaths against the Sonoran Desert, as well as the distance they likely had walked each day after crossing the border, in order to warn potential border crossers of the perilous journey. [27]
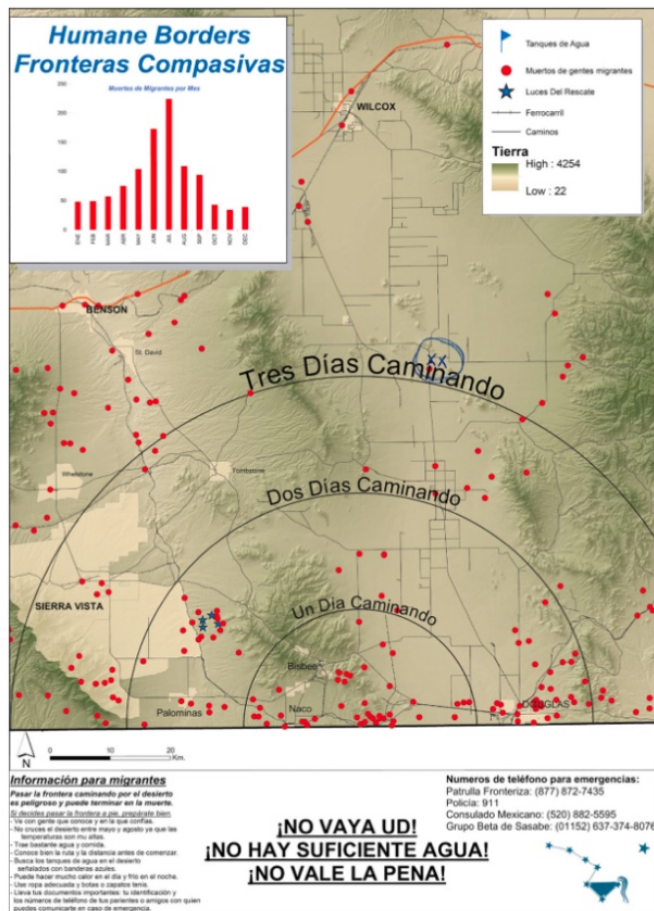
Figure 4. Luiselli's reprinted and annotated version of Arizona OpenGIS Initiative for Deceased Migrants map [Luiselli 2019a]

As aforementioned, this map functions as a counter-map insofar as it charts deaths that have been both caused, and erased, by policies such as Prevention Through Deterrence. Yet, Luiselli cues a reading of this map as also inevitably exclusionary and, in this sense, complicit with invisibility. Noting how maps can "make visible what is usually unseen," the mother-protagonist nevertheless concludes that "To map is to include as much as to exclude" [Luiselli 2019a]. More than associate excluded remains with invisibility, however, she connects them specifically to sound. A section of the book titled "Undocumented," for example, begins with the epigraph, "An exile feels that the state of exile is a constant, special sensitivity to sound" [Luiselli 2019a]. In the context of the U.S.-Mexico border crisis, "undocumented" thus takes on multiple meanings, including unmapped, unseen, and yet still potentially audible.

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Auditory studies of the U.S.-Mexico border are far less abundant than visual ones, yet multiple artists, activists, and scholars have likewise observed this area's sonic dimensions to be uniquely boundless. In an analysis of how composer Guillermo Galindo turns objects found along the U.S.-Mexico border, including the border wall itself, into musical instruments, culture and music scholar Josh Kun observes sound to be more permeable than sight. Noting how we can readily hear the border's other side, even without full vision, Kun states, "What walls and fences are meant to divide, sounds can move through and resonate across. What looks monumental to the eye sounds unmonumental to the ear. There are no borders for vibrations" [Misrach 2016]. Here, Kun touches on the material *and* immaterial nature of sound, for such vibrations only become audible, even amplified, through the very objects they contact. This makes containing sound very difficult, as even ostensible silence often involves resonant vibrations. In auditory encounter, something usually escapes, perceived or unperceived. Given this unmonumental medium and sense's historic subordination to sight as form of knowledge, however, such sound often fails to adequately capture human ears, let alone imaginations.

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For this reason, multiple humanities and digital humanities scholars frame listening as an acquired, not default, sense. As Jonathan Sterne explains, listening is a technique that "connotes practice, virtuosity, and the possibility of failure and accident […] It is a learned skill" [Sterne 2003]. For the mother-protagonist in *Lost Children Archive*, listening evolves from simply hearing sound, namely that of migrants' oral testimonies, to sonically counter-mapping a landscape of unbounded phenomena. During a moment of revelation, she realizes that both her and her husband's research projects entail "chasing ghosts and echoes" [Luiselli 2019a]. Her husband's ghosts and echoes are those of the last Apache leaders, including Chief Cochise, Geronimo, and the Chiricahuas. As the final indigenous Americans to surrender to settler-colonists and their Indian Removal Act, which forced remaining tribes onto federal reservations, these people were exiled from their own homeland just like many migrant refugees and deportees. The mother-protagonist draws this parallel most closely as she watches a plane of child refugees head back to their ostensible homeland, yet only by departing from the land of their probable ancestors, as well as current family (191). Because migrant and indigenous populations have been effectively disappeared, one through "removal" and another through "deportation," both the mother-protagonist and her husband necessarily take a spectral approach to sound.

According to Ana María Ochoa Gautier, the "spectrality of sound" refers to that which remains inaudible, at least to humans, as "excesses of the acoustic" [Steingo 2019]. Another sense in which sound is boundless, for example, involves the fact that it reverberates well beyond human hearing, including in acoustic *and* ultrasonic forms. If a bat chirps or cactus falls in the Sonoran Desert and no human hears it, it still does make a sound. Furthermore, that sound may interact with and turn into other sounds, commonly called echoes. In *Lost Children Archive*, both the husband and wife appeal to echoes as a trope for spectral listening to that which they both can and cannot hear. However, only the wife practices such listening as a dynamic and disorienting mode of counter-mapping. For her, such counter-mapping entails contextualizing sounds, as well as related ideas, against hegemonic maps of time, space, and subjects as singular and absolute.

According to the wife, her husband claims his project to be an "inventory of echoes" [Luiselli 2019a]. Yet, he never elaborates more than that, since his understanding of sound as self-evident affords him a rather literal definition of echoes. An "acoustemologist" trained in "soundscaping," the husband follows the work of R. Murray Schafer and shares his interest in acoustic ecology as "the study of sounds in relationship to life and society" [Schafer 1977]. For Schafer, as well as *Lost Children Archive*'s husband, the bulk of this study entails recording, naming, and cataloging sounds in an effort to capture, and thereby understand, "the general acoustic environment of a society" [Schafer 1977]. While most sound scholars recognize Schafer as pivotal in establishing sound as another way of knowing, they also criticize his presumptuous appeal to "the general," or universal, as neglectful of sound's multivalent, and highly contextual, meanings [Novak 2015].[7] Similarly, the wife assesses her husband's work as crudely matter-of-fact. For him, bird chirps, arroyo babbles, snake rattles, wind gusts, etc. heard in the present are, inevitably and indubitably, reverberations of sound waves from foregone times and peoples. Given the mother-protagonist's attention to uncertainty and exclusion, however, she interprets his inventory of echoes as "*trying* to capture their [the Apaches'] past presence in the world, and making it audible, despite their current absence" [Luiselli 2019a, emphasis added].

Instead of presuming presence, she is inclined to chart and interrogate it. Thinking of her husband's inventory as a form of sound-mapping, therefore, she imagines that each echo temporarily "illuminate[s] an area of a map, a soundscape, in which Geronimo once was" [Luiselli 2019a]. Here, the wife crosses sight and sound in conceptualizing an illuminative echo, one that appears and disappears simultaneously. Using the spectrality of sound to trace the spectrality of removed populations makes sense to this cartographer, especially as she refuses to organize her own recorded material into a "clean narrative sequence" [Luiselli 2019a]. As she states, "We haven't understood how space and time exist now, how we really experience them" [Luiselli 2019a]. In her evaluation, archivists such as her husband often fail to acknowledge the way all hearing, including all recording, is contextual: that is, it takes place in a particular time and space, neither of which are entirely singular or absolute. Situating all recording as a type of echo, Mark M. Smith similarly emphasizes the need to think of both as simultaneously historical and ahistorical. Rather than capture sounds from the past exactly as they were, recordings and echoes reproduce sounds from the past in the present, inevitably altering them [Novak 2015]. For the wife in *Lost Children Archive*, this means that sounds, as well as the times and spaces in which they reverberate, take on multiple, ever-changing meanings. They are dynamic and, for this very

reason, also disorienting.

As such, her mode of listening closely corresponds with Nicole Brittingham Furlonge's "aural literacy," which she claims to entail "listening as an artistic, civic, and interpretive practice that emerges from a place of wonder, curiosity, and *not knowing*" [Furlonge 2018]. Drawing from a multimedia archive of work by black authors and artists, Furlonge examines how literary texts can shift reading from a strictly visual practice to one that "demands an aural sensory engagement" in which readers "think with their ears" about historical constructions of racial difference.[8] Although, or perhaps *because*, literary texts are technically silent, they can guide readers in hearing and thinking about sound in innovative ways, including as an "epistemic site" for questioning historical hierarchies and identities [Furlonge 2018]. Acknowledging the close connection between *how* we know and *who* we understand humans to be, or not be, *Lost Children Archive*'s mother-protagonist likewise listens from a position of inquiry. Instead of distinguishing and labeling sounds, for example, she hears them together as a collective victim of history, or what she calls "beautiful things falling apart" [Luiselli 2019a].

Attune to the very lack of visual and material evidence concerning migrants, the mother-protagonist instead listens for additional unknowns, mostly in the form of other historical instances of disappearance. Hearing spectral sounds of the Apache, missing border crossers, and surrounding desert landscape all at once, she observes "the chaos of history repeated, over and over, reenacted, reinterpreted, the world, its fucked-up heart palpitating underneath us [...] And in the middle of it all, tribes, families, people, all beautiful things falling apart, debris, dust, erasure" [Luiselli 2019a]. This description is highly reminiscent of philosopher Walter Benjamin's "Angel of History," which recognizes the past, present, and future as "one single catastrophe" in constant risk of oblivion, especially under the pressure of "what we call progress" [Benjamin 2007]. Like this angel, and more critically than her husband, Luiselli's mother-protagonist thus hears bird chirps, arroyo babbles, snake rattles, wind gusts, etc. as "reenactments" and "reinterpretations" of loss: the loss, yes, of child migrants but also the indigenous populations that preceded them and likewise endangered wildlife that accompany them. Elsewhere elaborating that "perhaps my children's voices were like those bird songs that my husband helped Steven Feld record once, which function as echoes of people who have passed away," she effectively collapses human-nonhuman binaries [Luiselli 2019a]. Yet, she maintains her uncertainty, as well as curiosity, through her insistent use of "perhaps." In doing so, she shows the practice of "aural literacy," or interdisciplinary listening without knowing, to function as a viable mode of counter-mapping against categorical understandings of time, space, and subject.

IV. Digital Humanities Counter-mapping: A Case Study

Background

Thus far, I have examined a variety of visual, sonic, textual, and digital counter-maps. While De León and Luiselli make use of the Arizona OpenGIS Initiative for Deceased Migrants map, which plots migrant deaths against the Sonoran Desert in order to expose the violence that policies such as Prevention Through Deterrence attempt to conceal, neither of them replicate this map's digital interface or related humanitarian maneuvers. Rather than try to restore migrant victims' visibility and voice, either in life or death, De León and Luiselli take more reflexive approaches to witnessing. Questioning their own use of sight and sound while consulting visual, material, and sonic evidence, these scholars practice "sideways" seeing and spectral listening, both of which serve to witness the complexity of this U.S.-Mexico border crisis. Such complexity, as De León and Luiselli illustrate, is largely due to the involvement of human and nonhuman, as well as present and absent, agents. Since this border violence also implicates settler colonialism and imperialism, as well as the hegemony of visuality and human rights politics, it requires multiple, novel ways of knowing, including of mapping.

Accordingly, De León and Luiselli counter-map this crisis in ways that decenter the human, both as sensate being and liberal human rights subject. Building off of the counter-mapping possibilities evident in De León and Luiselli's work, I now tap into the "subversive force" of digital humanities as a tool for "rethinking" traditional assumptions and practices, including those of the U.S. Department of Homeland Security and human rights activism alike [Hayles 2012]. In particular, I remain curious about how multi-sensory counter-mapping helps readers and listeners further disorient

themselves and, in the process, also the Sonoran Desert as a land that has been so forcefully oriented around the human, both as aggressor and as victim. Rather than centralize the human in witnessing the U.S.-Mexico border crisis, is it possible to listen from the perspectives of the many nonhuman agents involved, including those of dirt, animal, and wind? In other words, is it possible to hear what the desert hears?

Informed by Luiselli and De León, as well as other interdisciplinary cartographers and my own fieldwork in Southern Arizona, I have initiated a pilot project for counter-mapping the U.S.-Mexico border crisis as both a humanitarian crisis and a crisis of humanitarianism, or the centering and privileging of human victimhood. To be clear, my project is far from the first digital counter-mapping project about this crisis. Yet, many of these projects are principally visual and anthropocentric in nature. In addition to the aforementioned Arizona OpenGIS Initiative for Deceased Migrants map, *Torn Apart / Separados* is a scholar-activist intervention that has circulated widely since 2018. A response to the Trump administration's zero-tolerance family separation policy, *Torn Apart / Separados* includes digital maps about ICE facilities, political funding, and deportations, as well as allied organizations for migrants. The *Torn Apart / Separados* team claims this work "peels back layers of culpability behind the humanitarian crisis of 2018" and exposes otherwise overlooked agents in the border crisis, such as the amount of ICE contracts awarded per congressional district. These cartographers also note the inevitably "imprecise" and "contingent" nature of data visualizations, including maps, but do not detail their exclusions [Torn Apart 2018].

Though humanitarian maps about the U.S.-Mexico border crisis tend to exclude data on nonhuman victims, land and wildlife studies of this region do often make some mention of disappeared migrants. In a recent joint press release from the Center for Biological Diversity, Sierra Club, and Sky Island Alliance, Tucson-based environmental activists critique border militarization as detrimental to all local communities, including transitory ones. Protesting border wall construction for further impeding "the natural migrations of people and wildlife that are essential to healthy diversity," these activists called for an immediate halt to such construction [Jordahl 2020].[9] Laiken Jordahl, Borderlands Campaigner for the Center for Biological Diversity, and Emily Burns, Program Director for Sky Island Alliance, are two such activists who regularly publish field research documenting life and loss along the border. For example, Jordahl has published multiple photos and videos of bulldozing and blasting through Organ Pipe Cactus National Monument, which decimated endangered animal habitat and Tohono O'odham sacred sites for wall building. Focusing on the nearby Patagonia and Huachuca Mountains, Burns directs a binational Border Wildlife study catalogs species in the area through clandestine cameras.

While much research and activism along the border is multi-sensory insofar as it utilizes sight and sound, as well as other senses, to document ongoing violence and resistance, I contend that crossing senses can further decenter the human in this border crisis. In "A sensory approach for multispecies anthropology," Natasha Fijn and Muhammad A. Kavesh defend the combination of sensory ethnography and multispecies anthropology as part of a "post-humanist analysis" that is ecological, not anthropocentric, in nature [Fijn 2021]. Following fellow anthropologist Anna Tsing, they advocate a practice of observing and contemplating relationships among humans and nonhumans, including their shared precarity. Against human exceptionalism, this practice aims "to think beyond the boundary of the human, beyond 'anthropos' or 'ethnos'" [Fijn 2021]. My counter-mapping project shares this aim, with the practical purpose of exposing the humanitarian crisis as the U.S.-Mexico border as also ecological in nature.

Methods

While multiple scholars have considered the possibility of witnessing beyond the human using an anthropological or philosophical approach, I here adopt a digital humanities approach, with a particular focus on pedagogy and practice.[10] As such, my remaining concerns closely align with those of Steph Ceraso, author of *Sounding Composition: Multimodal Pedagogies for Embodied Listening*. In this book, Ceraso investigates how multimodal pedagogies and projects, including digital sound maps, facilitate "a reeducation of our senses — a bodily retraining that can help listeners learn to become more open to the connections among sensory modes, environments, and materials" [Ceraso 2018]. Like Furlonge and Luiselli, Ceraso advocates for an interdisciplinary, or "multimodal," practice of listening that involves thinking critically about the experience of sound, which she understands to be a "contextual [...] sonic event" [Ceraso 2018]. While "multimodal" implies that there are discrete modes of knowing and being, for example, Ceraso recognizes

such separation of the senses to be historically and culturally learned.

In turn, her practices of multimodal listening and digital sound mapping involve attending to the ways senses interact with, and even subvert, each other in creating an embodied experience of place. More than simply "listen" with their ears, Ceraso's students record the time of day and weather conditions of their audio recordings; look for visual and tactile proof of sonic vibrations; write textual descriptions of fieldwork experiences; and reflect on the limits of a digital interface such as Soundcities [Ceraso 2018]. By crossing multiple senses while collecting data, students gradually recognize such sensory knowledge as both contextual and partial. At stake, therefore, in this "reeducation of our senses" is not just a newfound attunement to the complex connections among humans' own sensory modes, but also among those modes and surrounding "environments" and "materials." Such attunement, according to Ceraso, challenges visual approaches to knowing, "ear-centric" approaches to listening, and, in my evaluation, also anthropocentric approaches to the humanities, including related humanitarian concerns [Ceraso 2018].

Informed by Ceraso, Luiselli, and De León, as well as the interdisciplinary scholars mentioned throughout this article and my own fieldwork in Southern Arizona, I have created a digital counter-map that decenters humans as the sole victims of the U.S.-Mexico border crisis. In this ArcGIS project, accessible here and represented in Figure 5, I combine sonic, visual, and literary evidence, sometimes together, at the same geotag, and sometimes apart. Such evidence, or proof of existence, includes descriptions of deceased migrants' "body condition," audio recordings of animals, photos of desert landscapes, outlines of endangered species ranges and border walls, and excerpts from multiple texts, including De León's *The Land of Open Graves* and Luiselli's *Lost Children Archive*. As my practice of "Counter-mapping the U.S.-Mexico Border Crisis," these map layers and survey points work against hegemonic practices of documentation, including those historically privileged by the U.S. Department of Homeland Security, human rights activism, and the field of digital humanities alike. As previously explained, hegemonic practices separate and hierarchize species and senses, privileging humans and their vision simultaneously. In contrast, my practice crosses species and senses alike, showing all to be in relation, and also in danger.
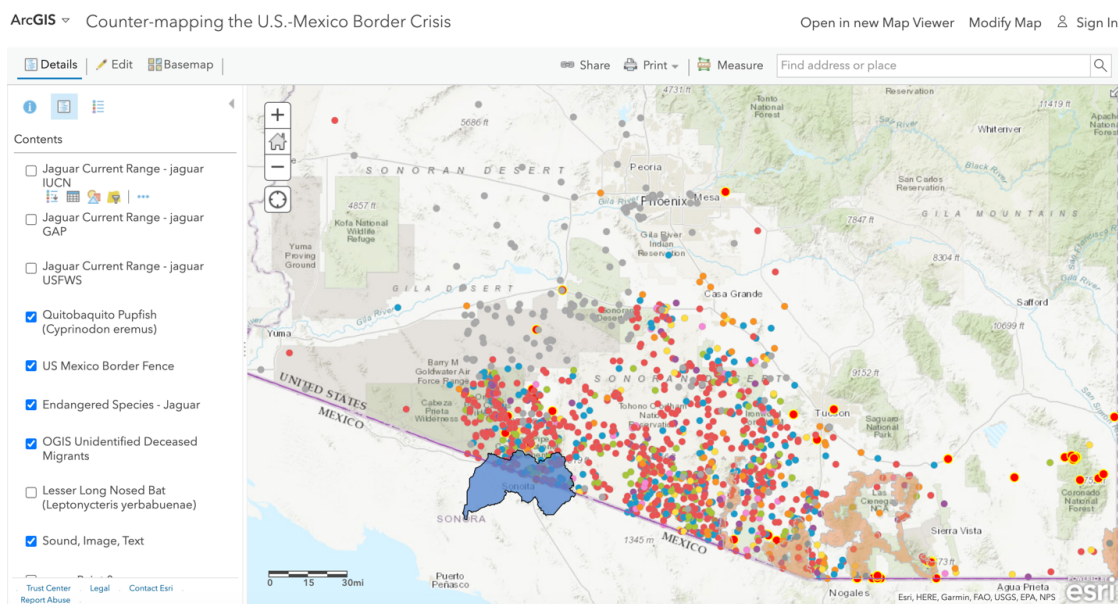

Figure 5. "Counter-mapping the U.S.-Mexico Border Crisis" in full view, with selected layers in sidebar

I first recognized the need for this counter-mapping methodology in March of 2019, while co-leading a university trip to Southern Arizona called *Conocimiento*, or "awareness." To expose students to the complexities of the U.S.-Mexico border crisis, this trip included meetings with various on-the-ground actors, including border residents, patrol agents, activists, and unauthorized day laborers. Depending on the actors' differing interests, they referenced maps foregrounding border wall construction, military checkpoints, humanitarian aid stations, or, most commonly, the discovery of human remains. Throughout this trip, we saw at least three versions of Humane Borders' "Map of Migrant

Mortality," which De León and Luiselli both reference in their work. Because my students had not read these authors' depictions of the Sonoran Desert hybrid collectif, I feared that their perception of this landscape would be reduced to the hostile, even criminal, terrain that policies like Prevention Through Deterrence situate it as. It was during this trip, therefore, that I began brainstorming ways to map this landscape differently.

Like Ceraso, I wanted to put my students into a collaborative, even conversational, interaction with their surroundings. What did they hear as they took photos of Normandy-style vehicle barriers, Cottonwood trees, and a horizon often dotted with at least one memorial cross? How might this hearing change if they simultaneously recalled Luiselli's onomatopoeic depiction of desert dust-clouds appearing and disappearing as "Shrrrrrr, sssssssss, hsssssss, sss, hhhhh," or Jason De León's graphic description of a mummified migrant corpse with a face "replaced by a stone-colored ghoul stuck in mid-scream"? And what if they could digitally return to this location months later to hear the nocturnal chirp of a Whippoorwill that escaped their notice while they were previously there in person? To begin investigating these questions, I consulted the Institute for Digital Arts and Humanities (IDAH) at Indiana University Bloomington about multimedia map tools. A group of faculty, graduate students, and staff who specialize in digital methods, IDAH recommended Esri's ArcGIS Online and ArcGIS Survey 123 for their institutional availability and ease of use.[11]

Yet, while Esri is the industry standard for commercial Geographic Information Systems (GIS) software, its open partnerships with numerous private and public agencies, including the U.S. Department of Homeland Security, initially give me pause. As the software that connects DHS' vast system of remote sensors, lookout towers, drones, and other agent-carried GPS technologies, ArcGIS both facilitates and maximizes security enforcement along the U.S.-Mexico border [De León 2016]. Yet, these very same technologies can likewise map and critique the systemic violence of such enforcement. Like De León, I thus began experimenting with co-opting "the master's tools" by uploading various online resources into a map titled "Counter-mapping the U.S.-Mexico Border Crisis."

The first resource was the open source data from the Arizona OpenGIS Initiative for Deceased Migrants, from which I selected "unidentified" remains and created color-coded survey points based on the "body condition" upon discovery. Such anonymity, along with conditions that range from "fully fleshed" to "skeletonizaton w/ mummification" to "complete skeletonization w/ bone degradation," emphasize the postmortem dehumanization of these human corpses. Especially in death, migrant bodies become indistinguishable from the landscape that both witnesses and facilitates their gradual decomposition. To further challenge human-nonhuman binaries, I next searched online for digital sounds and images representing the natural environment implicated in the U.S.-Mexico border crisis. This search yielded multiple relevant materials, including those from Sky Island Alliance's Border Wildlife Study, Charles Bogert's *Sounds of the American Southwest*, The Western Soundscape Archive, and The Acoustic Ecology Lab at Arizona State University.

While I was pleased with the variety of visual and auditory resources available online, an essential part of producing my counter-map was field photography and sound recording. When initially conceptualizing this project, I was set to lead additional *Conocimiento* trips and planned on including those students in on-the-ground data collection using the aforementioned ArcGIS Survey 123. The COVID-19 pandemic cancelled those plans, yet I was able to make multiple solo visits to Southern Arizona in 2020, including to Chiricahua National Monument in early March, Organ Pipe Cactus National Monument in late March, and the Huachuca Mountains in late September. Each of these places has a history of forced displacement, including the Apache Wars taking place around Chiricahua National Monument and ongoing border militarization happening throughout Organ Pipe Cactus National Monument and the Huachuca Mountains. I visited Organ Pipe Cactus National Monument as the Trump administration expedited border wall construction along its southern edge, destroying local flora, animal habitat, and Tohono O'odham sacred sites in the process. Similar construction eventually reached the Huachuca Mountains in 2021, after I had already visited the area.

During these respective visits, I camped, hiked, and recorded what I encountered. With the continued support of IDAH, I was able to borrow their Sony IC recorder for short audio samples. While relatively basic, and prone to picking up wind sounds, this recorder still captures the spectrality that interests me most about soundscapes. Like the mother-protagonist in Luiselli's *Lost Children Archive*, I listened for presence and absence, appearance and disappearance. And unlike the U.S. Department of Homeland Security, I did not map such listening with the purpose of definitively locating, tracking, or identifying anything. Instead, I aimed to use digital data and GIS software to record a multi-sensory

experience of a landscape that humans cannot readily understand. For this reason, I recorded sonic environments that spontaneously intrigued me. There was never any recording schedule or inventory, though I did keep track of the date, time, and location of each recording. I did this because I would like to eventually return to these same places and listen for changes in the soundscape.

Results and Discussion

<div style="float: right;">50</div>

Joining Sterne, as well as Furlonge and Ceraso, in conceptualizing listening as "a learned skill," I see the purpose of this counter-map to be practice: that is, the interminable practice of witnessing human bodies, as well as human-made maps, as in dynamic relation with environments that both includes and exceeds them. Against simplistic representations of the Sonoran Desert as hostile terrain rife with humanitarian crisis, "Counter-mapping the U.S.-Mexico Border Crisis" thus situates this landscape as endangered, biodiverse, and complex beyond absolute comprehension. While my ArcGIS map is still informative, especially to those who have not visited Southern Arizona in person, its multiple layers orient and disorient viewers simultaneously. Firstly, the diversity and quantity of information is overwhelming, as this digital map includes images, sounds, textual excerpts, animal ranges and migratory routes, border wall models, and hundreds of data points marking unidentified migrant remains. Secondly, many geotags include multiple types of media, thereby facilitating "sideways glances" in which map visitors think critically about this landscape, its history, and their sensory relationship to it all.

<div style="float: right;">51</div>

Given the continued disappearances and deaths of migrants crossing the Sonoran Desert, as well as the expedited construction of a new border wall system through wildlife corridors including the Organ Pipe Cactus National Monument and Madrean Sky Island Region and, structural violence in this region clearly affects humans and nonhumans alike. The Lesser Long-nosed Bat, one of many animals endangered by the habitat loss resulting from border crossing and militarization, migrates among various locations throughout Mexico and Southern Arizona, including the aforementioned wildlife corridors. [12] The northern part of this route consists of the Chiricahua National Monument, one of my field research sites and a place referenced extensively by family members in Luiselli's *Lost Children Archive*. Like this fictional family, I traced the Echo Canyon Trail, which descends into a dizzying maze of rhyolite hoodoos, or igneous rock spires. Since Luiselli's father character claims you can listen to the voices of fallen Apaches in Echo Canyon, the son enters its depths, eagerly shouts Geronimo, and hears "it bouncing back even stronger and longer, Geronimo, eronimo, onimo, onimo" [Luiselli 2019a]. Yet, as I traversed this same location, I tried to be as silent as possible while extending my small Sony IC recorder in the air, pushing record, and appearing to capture nothing but wind gusts, audible here.

Figure 6. Echo Canyon, part of Chiricahua National Monument

Had I not added a photo, represented in Figure 6, to this same geotag on the map, it would be hard to hear the audio recording as also documenting hoodoos, or rock spires, standing en masse. Had I not added the audio recording to this same geotag, however, map visitors likely would miss the uncanny experience of not knowing all they are witnessing or, stated otherwise, all that is present, absent, and spectral here. Given Echo Canyon's location along Lesser Long-nosed Bat migratory routes, for example, my recording could include ultrasonic echoes of last night's echolocation calls. Technically, the chance of this happening is very low, if non-existent. Imaginatively, however, this chance is nevertheless enough to be politically and ethically relevant. For knowing the possibility of *not* knowing, or indeed hearing the possibility of *not* hearing, is disorienting. Interacting with this digital map, therefore, visitors do not necessarily lose their sense of direction, but they very likely lose their sense of being at the center of all action and knowledge, including that of the U.S.-Mexico Border crisis.

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Just as De León claims that "people have to be decentered in the agency equation" of this crisis, I maintain that humans ought to be decentered from witnessing practices, including mapping. Yet, such decentering is admittedly difficult, especially given the anthropocentrism and anthropomorphism also prominent in sound studies. According to Deborah Kapchan, sound studies is still asking the key question of, "And how might attention to sound and affect produce a body unfettered by the dualisms of the Enlightenment — mind/body, nature/culture, man/woman, human/animal, spirit/material?" [Novak 2015]. Acknowledging the field's focus on humans, however, Sterne encourages continual "interrogation" of our own hearing, as well as our access to nonhuman hearing, including that of animals, land, and technology [Novak 2015]. For example, is it appropriate to say that land, and the geophones that pick up ground vibrations, "hear" anything at all? When an exhausted migrant falls to the desert floor, delirious from extreme dehydration, do the dirt, rocks, and nearby creatures even take notice? And when an ultrasonic recorder makes bat echolocation audible to humans, who, in fact, is doing the hearing? For Sterne, refraining from idealizing human and nonhuman hearing opens up new sets of questions about knowledge, subjectivity, and politics, namely politics that involve "hearing the hearing of others," or at least trying [Novak 2015].

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Following the Lesser Long-nosed Bat's migratory route southward, towards Mexico, on my ArcGIS map, I include a likewise multivalent audio recording from Organ Pipe Cactus National Monument, which houses Tohono O'odham burial sites and other endangered animals such as the Sonoran Pronghorn and Quitobaquito Pupfish. Upon first listen of this

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recording, audible here, one may vaguely hear bird chirps, footsteps, a trickle of water, and some kind of traffic. Only the expert ear would be able to identify the specific sound of steamrollers cruising along Highway 85, having just left the site of border wall construction near Lukeville, Arizona, where they likely aided the hasty removal of local flora and fauna. Similarly, only the expert ear would be able to identify the specificities of a morning birdsong medley recorded from inside a nearby camping tent, audible here. The point of this map, however, is not to train the expert ear, or even engage strictly ear-centric modes of listening. Rather, the point is to get map visitors thinking about what the human, including the human with digital technology, can and cannot witness in the Arizona desert: a landscape layered with historical, political, and environmental significance.

Like De León and Luiselli, I use this map to show that restoring the sight and sound, or voice and visibility, of human victims is insufficient to addressing the U.S.-Mexico border crisis. Rather than replace one mode of witnessing with another, however, this map models and facilitates a multi-modal, interdisciplinary interrogation of witnessing. As visitors navigate through images of landscapes, sounds of wildlife, and textual excerpts about local violence, they continually confront the challenge of comprehension, or understanding in an inclusive and absolute sense. Instead of providing easy or exhaustive answers, this digital counter-map invites participants into the ongoing question of hearing what the Sonoran Desert hears, as assassin, witness, and victim. Such inquiry is both orienting and disorienting, as it prompts viewers to engage the sensory and epistemological limits inherent to humanhood. Engaging these limits, however, also draws witnesses into closer, more attentive connection with the nonhuman ecosystems that both envelop and elude them.

Chances are that map visitors will never actually answer the complex question of hearing what the desert hears, yet asking it reminds them that such unknowns are also in crisis, and also worth protecting. As the Prevention Through Deterrence policy and other border militarization efforts remain in full effect, it is especially important to remember that the U.S.-Mexico border crisis necessitates epistemological and social, not just political, paradigm shifts. Indeed, it requires a decentering of visuality and anthropocentrism simultaneously, wherein witnesses recognize humanitarian and ecological issues as interrelated. As I have shown, this counter-mapping project contributes to such decentering by offering a practice of crossing the senses, leaning into disorientation, and collapsing human-nonhuman binaries. This practice is difficult and interminable, yet digital humanities pedagogies and projects like those I have demonstrated here also render it accessible, interactive, and impactful. At stake in such projects are not just "a reeducation of our senses" but also a reconfiguration of the world: a world that can better protect humans and nonhumans alike, together.

Acknowledgments

Notes

[1] This list is not exhaustive but includes a sampling of indigenous populations known to have existed in Sonora, Mexico [Zárate Valdez 2016] and Southern Arizona [Arizona State Museum 2016].

[2] For example, U.S. policy facilitated migration during natural resource booms and labor shortages but impeded it during The Great Depression and Cold War proxies throughout Latin America starting in the 1960s.

[3] Two reports that use this phrasing are The Binational Migration Institute's "A Continued Humanitarian Crisis at the Border: Undocumented Border Crosser Deaths Recorded by the Pima County Office of the Medical Examiner, 1990-2012" [Continued 2013] and the American Civil Liberties Union and Mexico's National Commission of Human Rights' "Humanitarian Crisis: Migrant Deaths at the U.S.-Mexico Border" [Jimenez 2009].

[4] While discussing this title in an interview, Luiselli translates "sonoro" as sonorous and highlights the double meaning of "sonorous desert" as referencing both a desert full of sound and a desert devoid of sound. This title also appears to riff on El Desierto de Sonora, the Spanish translation of the Sonoran Desert, but *Lost Children Archive* largely takes place in the Chiricahua Mountains, which lie east of the Sonoran Desert and predominantly consist of sky islands and grasslands [El Oriente 2020].

[5] The Colibrí Center, for example, describes its work as building "on a legacy of humanitarian work in Southern Arizona done by organizations such as Coalición de Derechos Humanos, No More Deaths, and Tucson Samaritans, all concerned with upholding human rights and human dignity throughout the borderlands" [Colibrí 2020].

[6] In contrast to DHS' use of GIS technology, the Arizona OpenGIS Initiative for Deceased Migrants map involves open source software and readily available data.

[7] According to David Novak and Matt Sakakeeny, who call R. Murray Schafer "sound studies' de facto founder," his influential work treats sound as a stable object with predictable effects on a "generalized perceptual consciousness," rather than a multivalent field that varies with individual, social, and environmental diversity [Novak 2015].

[8] These texts include Zora Neale Hurston's *Their Eyes Were Watching God* and Ralph Ellison's *Invisible Man*, among others.

[9] In January of 2021, President Joe Biden signed an executive order pausing border wall construction.

[10] Kate Jenckes' *Witnessing Beyond the Human: Addressing the Alterity of the Other in Post-coup Chile and Argentina* and Jane Bennett's *Vibrant Matter: A Political Ecology of Things* are two relevant philosophical studies.

[11] A mobile phone app for data collection, ArcGIS Survey 123 facilitates collaborative map-making among multiple parties, including professors and students.

[12] Threats to the Lesser Long-nosed Bat include drug and human-traffickers using their caves, the destruction of the cacti they feed on, and the construction of a border wall tall enough to disrupt their flight patterns. Though this bat was first listed under the Endangered Species Act in 1998, and subsequently delisted in 2018, it remains especially vulnerable to the heightened border militarization currently underway.

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