

## INTRODUCTION

# BEARING WITNESS TO TECHNOLOGICAL MULTISPECIES ENTANGLEMENTS

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A grizzly bear, brown and powerful, is frantically trying to escape a metal wire snare among some timber logs in the woods. We watch as rangers arrive, load a gun with a dart, and sedate the bear. They examine her (she is three years old, in good shape, big teeth), equip her with a VHF collar, and tag her ear with a yellow plastic label numbered “71.” After the bear wakes up, they release her, using fireworks to scare her away and condition her to avoid humans. From this point on, she is no longer a fully wild bear, doing whatever bears do in the woods. She is monitored and managed for the rest of her life.

Bear 71 was the protagonist of an award-winning interactive documentary released by the National Film Board of Canada (NFB) in 2012. The twenty-minute installation, viewable as a Flash-based website or as a virtual reality installation, follows the life of this one particular bear in Banff National Park from when she was captured, collared, and tagged at three years old until her death eleven years later.<sup>1</sup> Using a wide range of data collected in the Banff National Park, the team behind the documentary, headed by Leanne Allison and Jeremy Mende, could follow this bear as an individual in order to tell us not only something about nature, but also something about technology as a mediator and connector of lives across time and space.

On the website, after the short video introduction where we watch Bear 71’s capture, we are presented with a somewhat abstract and stylized 3-D map of a natural landscape, with dots and symbols moving around. The viewer is represented by an icon on the map, and we have the freedom to move around the map to explore. At times a scripted presentation takes over, with narration, text, graphics, and video. In wandering around the map, we encounter a wide range

of animals, each of them tagged with a number: not only Bear 71, but also other grizzly bears, black bears, deer, wolves, cougars, ravens, lynxes, crows, hares, big horn sheep, foxes, elks, mergansers, eagles, coyotes, dogs, humans, and horses. Some will wander in from beyond the edge of the map, some will leave the area, while others remain. Each has been observed at some point by a camera trap or other sensor, and clicking the icon of each creature brings up a video recorded by the camera trap. We watch them move around in the landscape; observe how the paths of people, animals, and things like cars and trains cross; and notice how alive this place is with living beings that move around and share the same place.

People, animals, infrastructure, trains, and cars inhabit, comprise, and move around this landscape. On the map interface through which we access the landscape, we see how multiple species share a space and inhabit a joint world, but are often unaware of each other. The video footage from the trail cams illustrates this well. For instance, on one hiking trail obviously made by people for human purposes, a bear comes up and smells around the area. Later, we see a moose walk across the same trail. Another trail cam is located at the underpass of a freeway where we can see a bear, a moose, and a group of people with inflatable bathing toys cross at different times. Yet another trail cam is located by the train tracks, where we can see a grain spill from a train. After a few minutes, a bear comes out of forest to eat grain. This is not an uncommon scene. A pop-up text mentions how the railroad has spent tens of millions of dollars trying to reduce animal deaths on tracks. Later, during one of the scripted segments of the documentary, we learn that this is how Bear 71 died—run over by a train while eating grain off the tracks. In bringing together all available data, Bear 71 comes to life—and death—for the viewers. While one can discuss the appropriateness of the anthropomorphic narration that the documentary attributes to Bear 71, the bear does become an individual through the myriad traces left in technological media.

Environmental historian Tina Loo has likewise tracked the life of an individual bear in Banff National Park.<sup>2</sup> Bear 148 was a well-known figure in the Bow Valley, having many documented encounters with people. However, these encounters eventually became too many, too close, and too threatening, so she was relocated to a more remote area. As Loo states, “We don’t think of wild animals like grizzly bears as having a history, but they do, and not just collectively and evolutionarily, but as individuals.” Technologies of monitoring allow people to get to know these animals as individuals. Together with artist and grizzly bear biologist Colleen Campbell, Loo explored location data as a way of writing animal history.<sup>3</sup> Building on artist Aaron Koblin’s observation that movement makes space, Campbell and Loo show how bear location data gathered by researchers give them some insight into bear country—landscapes as used and experienced by bears.<sup>4</sup> Yet writing animal history based on such data requires a

practice of critical empathy, informed by a deep understanding of bear behavior and environments.

A similar phenomenon takes place every year when the live streaming Bearcam from Brooks Falls, Alaska, starts up, and hundreds of thousands of viewers watch bears fatten up on salmon in the river. The web page hosting the live stream coming in from Katmai National Park and Preserve in Alaska has hundreds of thousands of comments where people discuss the bears, which have names like Chunk, Grazer, Otis, Holly, and Riffles in addition to their numeric identifiers. The webcam creates a real connection between watchers and bears: “When I sit in front of the computer, along with thousands of other viewers, mesmerized by the bears of Brooks Falls catching salmon, the bears and I are close together, despite being physically far apart.”<sup>5</sup>

Yet another bear, Bear JJ1, more commonly known as Bruno in the German media, serves as a counterpoint to this story.<sup>6</sup> Bear JJ1 was born in northern Italy, but made history when he wandered across the border to Austria and eventually to Germany in 2006.<sup>7</sup> Unlike Bears 71 and 148, JJ1 did not have a radio collar and could not be monitored in the same way. He was first observed in early May close to the Austrian village Tösens and would in the weeks to come raid farms and kill some farm animals, typically without eating them. Bear JJ1 evaded capture and control, however. Most observations were after the fact, consisting of dead animals, droppings, and the occasional sighting and subsequent reporting by locals.

The Austrian Bear Emergency Team, which had been founded to intervene with and manage wild bears in Austria, initially could not even reliably identify the bear and where it came from—was it one of Austria’s small native population or had it wandered in from elsewhere? JJ1’s behavior raised serious concern, as he seemed to kill animals for sport and showed little fear of humans. Austrian officials launched a plan to capture and radio-collar JJ1 so that they could anticipate his movements and intervene more easily should there be more problems. However, before they got that far, JJ1 left Austria and wandered into Germany, the first bear there in 150 years. JJ1 continued his killing spree in Germany, eventually triggering massive public debate about his fate. JJ1 became both a media phenomenon, getting the anthropomorphic moniker “Bruno,” and a political problem, being called a “problem bear.” Humans pass judgment on animal behavior. In the end Bruno was shot on June 26. Many argued that JJ1 should instead have been anesthetized and equipped with a GPS collar, in the belief that this would have brought him under control. Without such tracking, he died as he lived: unruly and unmanaged, challenging human valuations.

Bear 71, Bear 148, Bear JJ1, and the bears of Brooks Falls come across as individuals with individual stories. Their lives generate interest and their deaths become tragedies—they feel personal. However, it is only through their embedding in technological management systems, through monitoring and tagging,

that we get to know them.<sup>8</sup> The technology of tracking and visualizing these data allows humans to see this shared space and recognize that it exists. Technology has become a key part of how we know animals. Technology is mobilized to give us knowledge about a particular animal, but it also structures the relationship we humans have with that animal.

This book, which originated as a series of papers at a workshop at the Nordic Centre at Fudan University in Shanghai, China, explores precisely this tension between enabling and structuring human-animal relationships across space.<sup>9</sup> We seek to understand how technologies are part of the fabric that connect humans and animals to each other and the spaces we share.

### SHARING

Humans do not live alone in the world; they are always in relation with other species, from bears to bacteria. Humanities and social science scholars have begun to investigate these relationships, their reciprocity and their tensions, under the loose name “multispecies studies,” a formation that builds on decades of work in animal history, feminist studies, and Indigenous epistemologies. Multispecies studies focuses on “the multitudes of lively agents that bring one another into being through entangled relations.”<sup>10</sup> This is the kind of entanglement we see in the bear stories: animals’ lives intersect with the lives of others, whether through direct physical contact or even inhabiting the same space at a different time.

Bruno Latour has argued that the world is and always has been a place of socio-natural hybrids—“naturecultures,” which are a blending of environment and technology.<sup>11</sup> Natureculture as an epistemological, ethical, and aesthetic category has been widely accepted in the humanities and social sciences as a condition of the Anthropocene. With a multispecies approach, naturecultures extend beyond the technological to encompass how the other species around us are bound up with human cultures. The entanglement of species demonstrates that the multispecies world that we inhabit is by necessity a hybrid natureculture.<sup>12</sup> While this kind of entanglement is easy to see (though not actually easy to unravel analytically) with domesticated species,<sup>13</sup> it exists just as strongly with wild animals. Bears like 71 and JJ1, the people who collared and tracked them, and the geotracking technologies deployed together create a hybrid natureculture world.

Scholars in the multispecies studies field have pushed for an “attentiveness” to relationality and the ethics of entanglement.<sup>14</sup> Because there has never been a moment in human history in which animals did not play a part, writing animals out of the narrative “is a methodological, and even political choice” that needs to be countered.<sup>15</sup> Multispecies scholars advocate “staying with the trouble” to focus on the complexity of multispecies relations.<sup>16</sup> There are multiple ways of knowing and defining an animal, which lead to human-animal interaction

as an “active site of engagement,” as Zoe Todd has theorized with the case of human-fish relations in arctic Canada.<sup>17</sup> Different actor groups can enact what an animal is and how it should/could be related to in diametrically opposed ways.<sup>18</sup> The reciprocal relations between human and animal underpin complex political, cultural, and social realities.

## SPACE

Throughout this volume, we encounter humans and animals sharing a wide range of different spaces: in forests, in cities, underwater, and in structures like laboratories, farms, and abattoirs. These spaces emerge from interactions between humans and animals. We build on Doreen Massey’s understanding of space as “the product of interrelations, as constituted through interactions,” and thus “always under construction.”<sup>19</sup> The spaces we share are heterotopic, overlapping, and fluctuating, ever dynamic and flowing. They are subjectively experienced by people and animals alike, simultaneously existing “out there” in the world and inside the minds of people and animals, shared and yet not shared, or what Edward Soja calls “real-and-imagined” spaces.<sup>20</sup> They are lines on maps that can be mobilized for a variety of purposes. They are filled with natural, cultural, and infrastructural features.

Following the so-called spatial turn, scholars in a wide range of fields integrated space into their studies, exploring the many ways in which spaces comprise the world.<sup>21</sup> Geographers in particular have been concerned with the where-ness of the world,<sup>22</sup> but fields like environmental history have also been intensely interested in the spatial character of historical events.<sup>23</sup> For instance, Bill Cronon’s hugely influential *Nature’s Metropolis* demonstrates how a metropolis like Chicago creates an extensive set of spatial relations around itself.<sup>24</sup> Cultural ideas are attached to space and place as well.

The bears discussed in this chapter, as well all the other animals in this book, direct our attention to the spatial relationships of humans and animals. Space is the fabric of all narrative and all interaction. History takes place here. As Øyvind Eide has argued, “People move in space, and we live our lives in time.”<sup>25</sup> Both humans and animals live their lives in time and space, always coexisting in either one or both. When they coexist in both, they physically encounter each other; when they coexist in only one, they may or may not be aware of each other.

Animals have made themselves at home in “our” space, because in fact it is not ours.<sup>26</sup> Chris Philo and Chris Wilbert argued in their volume *Animal Spaces, Beastly Places* that human ideas of animal spaces, where animals belong and what they should be doing there, are different from beastly places inhabited and used by animals for their own purposes.<sup>27</sup> Their book was a significant contribution to the field of animal geography, making a strong claim for why social science needs to consider animals. Philo and Wilbert are central in the third

wave of animal geography, defined by Julie Urbanik, as an interdisciplinary and multidisciplinary effort “to see other-than-human beings as actors in the world.”<sup>28</sup> There is now a recognition that human-animal interspecies relations are located in space and geography.<sup>29</sup>

How animals are monitored, interpreted, and categorized has spatial implications for them. Like we do in this chapter, Hodgetts and Lorimer open their exploration of animal spaces with bears, comparing wild-roaming and sometimes transgressing polar bears with pacing and depressed polar bears in captivity.<sup>30</sup> Space matters to these bears. As the Bear 71 installation demonstrates, the space portrayed is defined by the bear, rather than being a human definition of space. We share space, but that space may not be defined or constructed in the same way by all the parties involved. Power relations are at work in the making of space. Following Lefebvre, we realize that space is not an empty container or simply a place where people and animals meet. Rather, space emerges from the interactions we have with animals. Space is “a medium through which social relations are produced and reproduced.”<sup>31</sup>

### **TECHNOLOGY, MEDIATION, AND HUMAN-ANIMAL RELATIONSHIPS**

In this volume, we argue that sharing space between animals and humans is structured by technology. Technology, as we define it, is not restricted to modern digital technology—everything humans create as tools, from clothing to cars to computers, is technology. In the last decade it has become commonplace to attribute explanatory power to digital technology as a negative force in the mediated human relationship to the world;<sup>32</sup> however, this approach lacks historical insight—analogue technologies from aquarium glass to paper maps also mediate the human-nature bond. Technologies, whether digital or analog, are neither good nor bad, nor are they neutral.<sup>33</sup>

Scholars in the field of science and technology studies have examined technology as a mediator. As Latour has defined them, mediators “transform, translate, distort, and modify the meaning or the elements they are supposed to carry.”<sup>34</sup> Mediators are different from intermediaries, which do not transform the things they carry but simply transmit them as whole packages. Mediation can affect both the physical thing (whether animal, person, building, or object) and the perception of that thing. In this volume we show that technologies mediate human-animal relations.

The relationship between humans and animals takes place in particular spaces, so the technologies that create those shared spaces mediate the relations. The roads, railroads, and hiking trails in the bear stories all structure the places where meetings can happen. Some technologies, like the highway underpasses, disconnect animal mobilities from the human automobile traffic, whereas grain spilled along the railroad tracks attracts bears to a dangerous meeting point. Camera traps capture images of humans and animals alike tra-

versing the landscape, and digital technologies make those images available to others at a distance. Technological mediation can decouple spatial closeness from physical closeness.

Seeing images can give a sense of proximity, but what kind of encounters are possible when the historically and spatially situated context of the animal (and human) moves out of view? As Zeb Tortorici argues, based on a stereoscope card of Kodiak bears in the Brookfield Zoo, “exposure and observation of animals in captivity and death paradoxically distances the human viewer, both visually and ontologically, from the animal that is being viewed.”<sup>35</sup> On the stereograph these bears have a three-dimensional lively quality, yet what is shown is a scene of captivity and suffering. Even in the case of Bear 71, there is a question of whether or not capturing and displaying the bear’s death create a similar feeling of distance. The joggers who run in the same area are far less likely to be killed by a train, which demonstrates the fundamental power imbalance between these species that share space.

Humans have deliberately modified animals through domestication processes in order to fit them into our technological systems, while those systems are also modified around those animals in order to function. Animals from hunting dogs to work horses to dairy cows are technologically created beings modified by both breeding practices and the technological artifacts hooked up to them to convert their energy into work and products for humans.<sup>36</sup> It might be easy to see how technology is used in the automated milking shed with domesticated cows, but even wild animals are “domesticated” in a sense under technological regimes: they are collared, tracked, sedated, moved, sampled, and more.<sup>37</sup>

Technology is used for control, but also for care and conservation. Genetic technology, for example, is being used to re-create extinct species, a process labeled de-extinction. Projects to revive the passenger pigeon, mammoth, and thylacine are all ongoing. Such a time- and money-intensive technological process has been motivated by a desire to restore species and ecosystems, as well as a sense of guilt and grief for humans having destroyed them in the first place.<sup>38</sup> While advocates argue that the end result of this technological intervention is animal conservation, others have pointed to ethical problems, including the high number of individual animals who die during the technological trials, the uncertain availability of appropriate habitat for re-created species, and the funneling of funding to what might be seen as vanity projects.<sup>39</sup> As we wrote earlier, referencing Kranzberg’s laws, technology is neither good nor bad, nor is it neutral.

## OUR SHARED SPACES

This book explores nonhuman animals as kin, as companions, as food, as transgressor, as entertainment, and as tool. The relationships between those animals and humans happen in space through the mediation of technology. Technolo-

gies create the spaces of production, consumption, labor, and contact that bring humans and nonhumans into relationship.

We start with three chapters about domesticated animals. Nicole Welk-Joerger explores the calorimeter as a technological site at which human-animal relationships changed. The calorimeter was designed to scientifically measure the conversion of cattle feed into human food through the body of the animal. But the technological design required humans and cattle to work cooperatively, prompting the scientists to select particularly docile animals and certain feed mixes. The technological choice of the calorimeter as the space of interaction reinforced industrial thinking about human-animal relations on the farm.

Tatsuya Mitsuda takes us into the slaughterhouse in the second chapter. Using the case of occupied Qingdao at the beginning of the twentieth century, he investigates how Chinese cattle bodies were envisioned and processed in order to meet the transnational demand for milk and beef. He discusses how these bodies were “made fit for” particular human populations through hygienic and scientific techniques.

Based on ethnographic fieldwork, Aurore Dumont explores how technology shapes the relationship between pastoralists and their herds in contemporary Inner Mongolia, People’s Republic of China. She argues that many anthropologists have discounted technology among these Tungus and Mongol pastoralists, writing about it as material culture or technique, even though the use of modern technologies such as motorized vehicles, mobile phones, and GPS abounds in these societies. The introduction of mechanized mobility technologies because of structural and policy changes in the latter half of the twentieth century has created new patterns: previously nomadic herders have moved from traditional yurts into mobile homes and travel by truck, which allows settlement farther from herds and reduced physical interaction with the animals. Technological change has modified the spatial relationship of pastoralist and herd.

Human-animal entanglements through hunting and scientific conservation are also technologically mediated. Karin Dirke offers a close reading of hunting stories in the Swedish hunting magazine *Jägaren* at the turn of the twentieth century to illustrate how the killing of animals was managed through the entanglement of ethics and technology. She shows that the inherent violence of the hunt was ameliorated in the minds of Swedish hunters through the deployment of technology that would kill the animals as quickly and “cleanly” as possible. The magazine itself also serves as a space of encounter for these hunting stories, with language evoking the soundscape and chronography of the scene in order to allow hunters to experience another hunter’s remembrance of space and animal encounters.

The next chapter continues the theme of hunting technology and animals, but brings it to contemporary times. Finn Arne Jørgensen examines the use of GPS collars on dogs used during moose hunting in Sweden. Although



hunting has always relied on tools, the integration of GPS tracking collars in hunting practices augments the hunter's ability to remotely sense the environment. Jørgensen finds that the triad relationship of hunter-dog-moose is mediated through the GPS device: the hunter knows where his dog is through the screen and in turn can "see" the moose on the screen by interpreting the dog's movements.

Heta Lähdesmäki's chapter turns to a different but related use of tracking collars: wolf conservation in Finland. She shows how the human-wolf interaction is co-constructed through the collar data. Radio-tracking practices require humans and wolves to have physical contact when the animal is caught for collaring, but then permit researchers to be close at a distance through the data signal. Through GPS signals, wolves became individuals with spatial and temporal histories, distinct from the wolves of myth and folklore.

We stay in the fields of Finland with an investigation by Tuomas Räsänen into human-eagle relations. Hated, feared, and often killed by legal and illegal hunting in the early 1900s, and threatened by environmental toxins in the post-war years, white-tailed eagles were almost extinct around the Baltic Sea by the 1970s. He argues that Finnish and Swedish conservationists rescued the eagles through a new type of "care protection" for birds, where the nurturing of individual animals was central to the success of the program. Technology mediated relationships, both between conservationists and between people and eagles, in ways that both hindered and promoted conservation.

In Ellen Arnold's chapter, we face an unexpected question: How do you send penguins by mail? This question arose when, in the 1930s, penguins arrived in American zoos for the first time in the wake of Richard E. Byrd's Antarctic expeditions. Trying to raise funds for future expeditions, Byrd offered twenty penguins for sale. In the deluge of mail from individuals who wanted to purchase penguins, the issue of how they would be transported was a central question. Arnold argues that transportation and communications technologies served to put penguins in the American environmental imagination.

Technologically mediated human-animal encounters also affect how and when we "see" animals. Dolly Jørgensen's chapter demonstrates how aquariums are planned and constructed spaces for visual encounters with aquatic species. Humans have looked at fish for thousands of years, but the aquarium made possible new ways of looking at aquatic life. Developments in material technology fundamentally changed the character of spectatorship interfaces. She shows how such mediating technologies connect, but also separate and distort, human-animal relationships.

Charity Edwards and Amelia Hine move us deeper underwater. Through their academic design backgrounds, they explore a speculative space in which southern elephant seals are used to remotely conduct oceanographic mapping and experimentation. The elephant seals are outfitted with technological de-

vices that allow the collection of deep-sea data on their regular feeding dives. These data are then put into the service of the extraction industry. The animals and their counterpart, autonomous underwater vehicles, converge as fellow workers in seabed mining. In Edwards and Hine's reading of the work of these elephant seals, the seabed takes on urban logics as the wild is domesticated.

Riin Magnus explores the use of electronic mobility aids in the communication between blind people and their guide dogs. As she presents it, every assistive device allows for different *Umwelten* for its users, building on Jacob von Uexküll's terminology for understanding the relationship between the self and the world. Tracing the development of such mobility aids back to World War I, Magnus demonstrates how the training of guide dogs combined with new technologies to enable communication between humans and dogs.

In the final chapter Concepción Cortés Zulueta explores what she calls a "technological love triangle" between humans, cameras, and other animals. She argues that cameras have changed the emotional framing of human encounters with other animals, reducing the perceived distance between them in significant ways. While pre-camera encounters typically were framed by a "Freeze, Flight, or Fight" response (in other words, considering animals as a perceived threat), Cortés Zulueta argues that a "Picture, Pet, and Play" response has become much more common.

To round off the volume Jenny L. Smith offers her reflections on the potential of scholarly inquiry into the technological mediation of human-animal relations. Noting the asymmetry of the sharing of space and the exploitation of animals through technology, she cautions that in the stories in this volume humans have often failed to consider their responsibilities to the animals with which they are entangled. She also finds visibility as a strand running through the papers in the forms of tracking, accounting, and display. While technology can make animals visible, scholars have a responsibility to make visible the entanglements created by the process.

The essays in this volume demonstrate how in modern society we have witnessed the rise of many types of technological ways of *being with animals*. Technologies at all scales, from the personal to the infrastructural, have become increasingly embedded in both natural and human-made environments since the mid-nineteenth century. The nonhuman natures that humans encounter have become thoroughly entangled with human technologies and societies. Transmission collars on bears, dogs, and wolves, as well as cameras, computers, and trains, all provide new ways of interacting with nonhuman nature. Through standardization, mechanization, and digitization, animals have become part of human machines. We encounter the bears of Brooks Falls and Bear 71 through our home computers and mobile phones, themselves just minor components of our networked digital society and its system of machines. We are *with animals* through technological means.

## BEARING WITNESS TO TECHNOLOGICAL MULTISPECIES ENTANGLEMENTS

Now we as scholars in the environmental humanities and affiliated fields are called to witness how ways of looking at, measuring, moving, and killing, as well as controlling, containing, conserving, and cooperating with, animals have shaped human relationships with the nonhuman world. Multispecies scholars have urged us to give attention to human-animal entanglements; as scholars we have a responsibility to bear witness to the place of animals in our lives—and our place in animals' lives. We all share space and stories. Technology has to be an integrated part of those stories.