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Zooveillance: Foucault Goes to the Zoo

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Abstract

The last three decades have witnessed a dramatic shift in the governance of North American zoo animals. During this period, captive animal administration has transformed from a materially, geographically, and technologically limited enterprise—focused on the control of individual zoo animals within specific institutions—into an ambitious collective project that encompasses all accredited North American zoos and that governs more than a million zoo animals. Tapping into a sophisticated voluntary and collaborative self-monitored administration, zoos have been able to rely upon genetics and demography to achieve the ultimate goal of captive animal conservation. This essay frames this story of animal governance as surveillance. It identifies three layers that work interdependently to produce captive animal surveillance in North American zoos: elementary surveillance, which includes the naming, identifying, and recording of captive animals on the institutional level; dataveillance, or the global computerized management of animal populations; and collective reproductive control. What underlies these three modes of surveillance—framed here as "zooveillance"—are notions of care, stewardship, and conservation. Based on a series of sixty semi-structured, in-depth interviews conducted with prominent zoo professionals in North America between May 2009 and April 2011 as well as observations of zoo operations and of professional meetings, this essay explores the relevancy and importance of applying the framework of surveillance in the nonhuman context of zoo animals.

Introduction

The last three decades have witnessed a dramatic transformation in the project of governing zoo animals. During this period, zoo animal governance has changed from a physically, geographically, and technologically limited enterprise focused on the internal management of individual animals, into an ambitious voluntary cooperation between North American zoos that relies on a combination of animal genetics and demography to achieve the ultimate goal of animal survival. My essay deliberately frames this story within the context of surveillance, identifying three interconnected layers that work to produce captive animal surveillance in North American zoos. Combined, these three surveillance layers are referred to here as "zooveillance."

First, the essay considers the most basic layer of zoo animal surveillance: the project of naming, identifying, recording, and tracking zoo animals. Drawing mostly on the scholarship of social sorting (e.g. Bowker and Star 1999; Foucault 2005; Friese 2010), this section explores both the powerful human urge for order and the strong normative assumption that the world can indeed be categorized systematically and exhaustively.

Second, the essay examines the proliferation of global database systems for governing captive animals and, most importantly, the recent introduction of ZIMS—the Zoological Information Management System—into captive animal governance. This sophisticated computer software systematically organizes and centralizes information about zoo animals worldwide. The move to ZIMS is both technical and qualitative:

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it marks the transition of zoos into a new and different surveillance era, which focuses on simulation, on the replacement of actual with virtual processes, and on various devices for encoding and decoding information (Bogard 1996: 3). In this context, the body of the captive animal is increasingly supplanted with its coded records (Braverman 2010b). By enhancing the ability of zoos to collaborate on a global level, ZIMS is likely to become an effective tool for the globalization of animal bodies.

Third, the essay discusses the recent emergence of a complex administrative network. Operating under the auspices of the American Association of Zoos and Aquariums (AZA), this network collaboratively self-governs certain captive animal populations within all accredited North American zoos. Describing the administrative committees and programs that underlie the project of governing captive animals, this part documents the transformation in the governance of certain captive animals into a reproductive enterprise that attempts the very creation of these animals. Put differently, zoo professionals are moving away from their previous focus on merely naming and identifying captive animals within individual institutions to collectively creating captive animals.

The zoo's triple mode of animal management elevates contemporary surveillance into the realm of "zooveillance," a term that I have coined here to refer to the project of intensely surveilling zoo animal populations in order to conserve them, which involves the creation of some of these animals through various administrative mechanisms. For the purpose of zooveillance, all AZA-accredited North American zoos function as a single system, voluntarily self-administering zoo animals to optimize their sustainability. This North American model of governing zoo animals has become the gold standard for governing captive animals in other developed regions of the world (Boyle, interview), in effect globalizing the institution of captivity.

This essay considers the uniqueness of captive animal governance in North America. Highlighting its underlying ethic of care and comparing it with the governance of domestic animals, the essay contends that the project of governing zoo animals requires a sophisticated and highly involved administration that is largely unknown outside of the zoo community. Despite their disparate histories, cultures, and financial situations, zoos from across the country voluntarily share resources to produce this collective form of governance.

The essay is broadly grounded in sixty interviews conducted between May 2009 and April 2011 with various North American zoo professionals (for a full list of interviews, see Braverman 2011c) as well as in a series of observations at AZA's professional meetings and of a variety of North American zoos, including the Buffalo Zoo, the Bronx Zoo, Toronto Zoo, and the Tennessee Zoo and Aquarium. More directly, the essay cites from ten semi-structured, in-depth interviews with zoo directors, scientists, and registrars who were selected based on a snowball method. The registrars were particularly helpful in deciphering the world of captive animal administration because their work focuses on collecting, recording, and tracking information about these animals. Before further discussing the three surveillance layers that pertain to zoo animals, a few words about my choice of surveillance as a framework for discussing the governance of captive animals.

Redefining Surveillance

Despite the broad definition of surveillance as involving "the collection and analysis of information about populations in order to govern their activities" (Bogard 1996: 3), scholarly endeavors on this topic have tended to limit the prospect of surveillance to humans (Rule 1973; Lyon 2001; Dandeker 1990). Conversely, this essay argues that it is instructive to explore the project of captive animal management as an instance of surveillance.

Current definitions of surveillance do not suffice to reflect the inherently intertwined nature of human and nonhuman surveillance. The essay draws on a more radical and explicitly inclusive definition of surveillance as encompassing "all forms of monitoring and control of human and nonhuman subjects, from individual people and things to groups, ecosystems, and planetary processes" (Donaldson and Wood 2004: 375). Within this broader surveillance framework, the project of governing zoo animals is unique in three ways: in the merits of this pursuit (creating a sustainable captive population for at least one hundred years); in the technologies of governance utilized (a sophisticated collaborate professional network); and in its subject population (animals rather than humans). Within the broader surveillance framework, zooveillance pertains to the particular niche of collectively surveilling zoo animals for their care and conservation.

Surveillance is often perceived as a negative practice that involves an intrusion into the privacy of the surveilled. This essay broadens the scope of surveillance to include the monitoring of populations (here, animals) in the name of their protection (here, conservation). This application draws on the Foucauldian tradition and especially on its later emphasis on pastoral power as a power of care (Foucault 1977, 2009) as well as on the more diluted realms of societal control hinted at by Gilles Deleuze in his influential *Postscript on the Societies of Control* (1992).

An inclusion of zoo animals within the scope of surveillance thus contributes to our understanding of surveillance as an expression of care (Gad and Lauritsen 2009: 55). Although care and technology may seem contradictory at first glance (Mol *et al.* 2010), this essay rethinks both to illuminate their inherent connections. "Zoo people care about animals [and] they care about the places where these animals come from," AZA's Senior Vice President Paul Boyle tells me in an interview. What drives the extensive administration of zooveillance is the desire to save animals, both in zoos (*ex situ*) and in the wild (*in situ*). Finally, the project of zooveillance also diverges from traditional surveillance accounts in that despite the fracturing affects of dataveillance, zooveillance very much relies on the spatial and physical properties of animals.

Elementary Surveillance: Naming and Record Keeping

Surveillance is about managing information. There is no strict science (or law) that zoos can follow when deciding what information to record about animals (Braverman 2011a). In the zoo world, record keeping is a constantly evolving process. Judith Block, one of the first zoo registrars in the country and a registrar at the Smithsonian National Zoological Park for over forty years, reflects on the changes in the zoo's record keeping processes:

> [In the past,] it was kind of by accident that records were kept and they were probably kept [only] for certain purposes. [For example,] when one of his snakes died, a curator [of ours] pulled the record of the oldest animal, so that he ended up with some really good longevity records… So the records served a lot of purposes. [But] this was a long, long time ago.
>
> (Interview)

Nowadays, Block adds, "you report everything."

Not unlike humans, animals have long been subjected to various types of naming (Hearne 2007). According to Jean Miller, registrar at the Buffalo Zoo, "any living thing that has been found, and seen, and identified, has a name" (interview). Specifically, zoo animals may be subjected to as many as four, at times even five, different naming systems: pet (or house) names, institutional numbers, global accession numbers, and scientific (and often also common) names. These forms of naming operate on a variety of scales and serve different purposes in that they offer distinct types of information about the animal.

Rachél Rogers, registrar at Zoo Miami, explains the need for house names: "the public loves it. They want to see Fluffy the Tiger. They want to see Jojo the Lion" (interview). Usually decided by keepers, this sort of naming is commonly an expression of their intimate physical bond with the individual animal.

Unlike house names, naming through sequential numbering is not an expression of intimacy but enables a more formal animal identification for the zoo's institutional records. According to Miller (interview), the first number identification system used by North American zoos was based on a sequential count of female and male zoo animals. In her words,

> For a while, the record was always based on tag number such and such, in the right ear. [But] you ran out of tag numbers, you ran out of tag colors. So they decided, well, maybe we'll call this number "1" male. And that's they way our system evolved… From about the 1960s to the 1970s that's how they were identified here: m1, m12, f5—down the line.

As a result of the growing numbers of animals at zoos, the simple sequential numbering system had soon reached its limit. According to Miller,

> They saw this record for m1, [but] is this the gorilla record or is it the roaming antelope record? So they thought, "ugh, this isn't going to work." You know, because you've got a piece of paper lying there, "keeper reports that m1 did such and such." [But], which m1 are you talking about? *So we needed something more*.

The improved numbering system entailed the addition of certain letters—"b" for bird, "r" for reptiles, etc.—to the previous male/female numbering system. Beyond identification, this type of naming used Linnaean taxonomy to classify the animal according to its taxonomic properties.

The more recent computerization of information has brought about yet another naming system. Until recently, the most comprehensive database system for zoo animals was the International Species Information System (ISIS). Founded in 1974, ISIS is the "world standard zoological data collection and sharing software, now used by 825 institutions in 76 countries" (http://oldweb.isis.org/CMSHOME/). An ISIS record has two parts: the zoo's name and the animal's assigned number, "so it is always indentified as Buffalo123 or Bronx123" (Miller, interview).

But basing animal identification on institutional identity proved problematic in the emerging global zoo world, where captive animals must be increasingly mobile. Consequently, a more comprehensive zoo animal database is currently in the works. It is called the Zoological Information Management System (ZIMS). ZIMS will eventually replace the institutional naming system of animals in ISIS with "a randomly generated [and global] nineteen digit number" (Miller, interview). This global administration forms the second layer of animal surveillance, discussed in more detail in the next section.

In addition to house names and institutional numbering systems, zoo animals are also subject to scientific names. Generally speaking, humans have classified, measured, and standardized just about everything—animals, human races, books, taxes, jobs, and diseases (Bowker and Star 1999: 17). What underlies Linnaean taxonomy in particular is the human assumption that all living things can be systemically compartmentalized into hierarchical categories. Such categories are then presented as mutually exclusive and as exhaustive, imagining a system that is both consistent and complete (Bowker and Star 1999: 10). Miller explains the use of scientific naming in the context of zoos. In her words,

> It's a way that people … across the globe, across disciplines … can talk about a particular thing without seeing it. Like if somebody says that they are going to send us *Panthera*

> *tigris altaica*…you know exactly in your mind the description of it, you know its size, you know its normal range, [and its] gestational period.

These few sentences capture what lies at the heart of modern population governance: the need to know a population from afar, without intimate contact with its individuals. In Foucault's words,

> Each group can be given a name. With the result that any species, without having to be described, can be designated with the greatest accuracy by means of the names of the difference groups in which it is included… In this way, a grid can be laid out over the entire vegetable or animal kingdom.
>
> (2005: 154)

Beyond its functional properties as enabling the collective use of information systems, the process of scientific naming weakens the materiality of the classified subjects (see also Bogard 1996; Haggerty and Ericson 2000). In the case of zoo animals, the general human urge for classification operates even more acutely: it is a way to harness the threatening properties of these animals' wildness into an orderly system through which they may be constantly observed, objectified, dematerialized, and, in turn, more closely controlled.

Naming is usually not an end in itself; rather, it is a means for identifying zoo animals. For a name to function as an identifier, a link must somehow be drawn between the animal's physical body and its written records. The concrete body of the animal is thus still a necessary component of its abstracted inscription (see also Latour and Hermant 2006). Whereas the personalized identification process sufficed when there were less animals and keepers and when both keepers and animals largely stayed at one zoo, zoos needed to create a more reliable link between the written record and the actual animal. To establish such a link, zoos now use radio-frequency identification (RFID) to identify their animals. A microchip that contains a unique digit combination is inserted into the body of the zoo animal and then read by a small transponder device. As a result, the zoo can match the animal body and its record. The zoo that inserts the microchip is responsible for entering its digits into the ISIS record and the chip then remains with the animal for its entire lifetime (Miller, interview).

In addition to its use in zoos, RFID-based technology is also commonly used in the pet and museum industries. Moreover, it has recently been applied to scrutinize the movement of human employees and to monitor money transfers, medical records, and passport details (Michael and Masters 2005). In the human context, the microchip is usually inserted into a keycard and not supplanted into the body, but this might be changing (e.g., FDA, Department of Health and Human Services rule, 21 C.F.R. 880 (2004) that approved implantable radiofrequency transponder systems as medical devices; see also Feder and Zeller 2004).

The RFID technology example demonstrates two interrelated points. The first is the enhanced dependence of current surveillance systems on machines to inscribe discrete observations (see also Braverman 2010a, 2011d). Machines have been replacing the earlier forms of disciplinary panopticism analyzed by Foucault, which relied more heavily on direct human observation. As argued by Gilles Deleuze, what were once autonomous and spatially enclosed disciplinary regimes have recently turned into limitless, yet more diffused, forms of control (1992).

Secondly, the RFID example demonstrates that although certain surveillance technologies may be necessary and legitimate in the animal context, once in existence they can potentially "creep" into other contexts (Marx 1989), where their use may be more problematic. Specifically, improving technologies in the world of animal surveillance may set the stage for similar projects of human surveillance.

Beyond the animal's name and identification, certain factors are more likely to be included in most zoo records than others. Whereas previously only the birth and death of animals were recorded, Lynn McDuffie of Disney's Animal Kingdom explains her zoo's current policy of recording the "central life events" of animals (interview). These events include the animal's acquisition and disposition information as well as behavioral issues, training process, and group composition. Additionally, the registrars interviewed here state that they include breeding and rearing information in their zoo records.

Yet the line between valuable and non-valuable information is not always clear. "You can't just be a technocrat," Rogers says, explaining that although the registrar's work seems technical it actually involves a great deal of human discretion. Since both under- and over-recording can interfere with animal management, a fine balance must be struck between a record that is too thin and one that contains too much information.

Dataveillance: From A(RKS) to Z(IMS)

> The surveillance analyst should not necessarily look for an observer gazing out the window, but rather for the bureaucrat located in his office, behind piles of papers and other inscriptions.
>
> (Gad and Lauritsen 2009: 52)

Initially, animal record keeping by zoos was an internal institutional endeavor. As such, it focused on the individual animal and varied from zoo to zoo. Recently, developments in computer database systems have enabled the design of an increasingly global and standardized animal record. The transition from the first to the second layer of surveillance is intrinsically tied to the parallel transformation of North American zoos from independent local institutions that focus on entertainment into a collective administrative network with a focus on conservation. This section explores the transition from the Animal Records Keeping System (ARKS) to the Zoological Information Management System (ZIMS).

Until recently, ARKS was the central animal database for much of the world. Established by the International Species Information System (ISIS), the ARKS database system contains the most basic information about the captive animal: its scientific and common names and identifiers, its sex, and its birth date. The ARKS database provides public access to this information worldwide. For example, using this system, anyone could find out, in a matter of seconds, how many bighorn sheep are currently held in zoos in the North American region.

Under the ISIS model, individual zoos performed an indispensable role. A zoo could record as much or as little onto the system as it wished. For the most part, the reliability of this information was not confirmed by any other agency. Furthermore, each zoo could decide whether to make the full institutional record of the animal—not uploaded to the standard ISIS format—available to other zoos through manual reports that were transported together with the animal.

As a result of the growing need for more information about captive animals, international efforts concentrated on modifying the ARKS model of the captive animal database program. In March 2010, ISIS released ZIMS. By the end of 2012, most ISIS members are expected to have switched from ARKS to ZIMS (ISIS website, http://www.isis.org/Pages/zims.aspx). According to Miller, over 700 zoos—the majority of accredited zoos worldwide—will participate in ZIMS.

Instead of using the zoo's internal identification process and institutional records to create the global database, ZIMS assigns animals an international form of identification. Registrars explain that the purpose of this global identifier is to create a less cumbersome and more reliable recording procedure. It will also be much easier, they say, to track animals when they are transferred between zoos. In most cases, such transfers occur when zoos comply with the recommendations issued by AZA's animal programs (discussed in the next section). By tightening the control over the animal's identity, ZIMS is expected to increase the efficiency and reliability of animal transfers between zoos. The globalization of animal records will thus facilitate the globalization of animal bodies.

The globalization of records is also expected to open up new prospects of collaboration between zoos worldwide. Whereas previously, international collaboration required using informal means to acquire information, it will soon be possible to determine the identity, location, genetic, and demographic properties of zoo animals worldwide by a simple click of a mouse. "If, for example, we need new cheetahs in our North American zoo collection," tells me AZA's Vice President Paul Boyle, "we [will] check on ZIMS and find out that Copenhagen has a large group of cheetahs." Once mostly confined to animals in North American zoos, the documentation of zoo animals is increasingly expanding in geography and capacity to include all accredited zoos in the world.

Yet the prospect of administering animals on a global scale is also daunting, says Boyle, mostly because it involves a complicated permit process (see also Braverman 2011a). "In my vision of the future," Boyle continues, "zoos will be exempt from this complicated permit process because they work for the public good and for conservation." At the same time, since science is advancing much faster than regulatory regimes, it may soon be unnecessary to move the entire animal; instead, freezing and transporting the animal's gametes will suffice.

Generally, the extensive reliance on databases and computer systems has attracted the attention of surveillance scholars, who have coined the term "dataveillance" to describe this shift in the mode of surveillance (Clarke 1988). Thus far, this term has only been used in the human context, ignoring its applicability and relevancy to the administration of nonhumans. The human context can in fact provide insights into the nature and the dangers of such a move to intensified dataveillance in the context of captive animals. Some surveillance scholars have warned, for example, that an intense reliance on computerized data systems might open up new and more serious prospects of error:

> Dataveillance relies on conscientious and accurate data input by a widely dispersed and uncoordinated network… Each keystroke contains possibilities of errors, some of which can have monumental consequences.
>
> (Haggerty and Ericson 2006: 16)

Yet despite the zoo's heightened focus on digitized surveillance, the animal's embodied existence still matters. Jojo the Lion is still identified as such by zoo visitors and by zoo professionals who work with this animal. The subject and product of zooveillance is different in various contexts. Whereas for many zoo scientists the lion's identity is a combination of genetics and demography, this may not affect the identity of the lion for many others. The zoo worker, the zoo visitor, its registrar and scientist—each sees a different lion, which in turn changes the form of surveillance performed. Zooveillance, then, is a question of perspective.

The embodied nature of the zoo animal also demonstrates that despite its focus on control, surveillance somehow always runs out of control. In this context, despite the numerous efforts on behalf of various zoo scientists and committees to decide which two gorillas should reproduce and where, at the end of the day the gorillas themselves execute the final and most important part of the plan: the act of mating. I will say more about this aspect of surveillance in the following sections.

Zooveillance: Controlling to Conserve

> Who will assume the authority of instructing us in the rules for allowing a species to die?
> (Conway 2003: 11)

The zoos' dramatic enhancement of captive animal dataveillance has largely been driven by the recent shift in their mission toward conservation. This section examines the nuts and bolts of the complex administrative structures and procedures for the collective management of North American zoo animals, referred to here as zooveillance.

The first syllable in the term "zooveillance" draws on Agamben's distinction between zoe, life as a property of organisms, and bios, existence as the object of a technique (Agamben 1995). The zoo animal lies in between the two: it is both surveilled for and through life itself and is also increasingly becoming the object of an array of technologies. At issue are the complicated intersection between genetics and biology as social forms and their embodiment as sets of practices, techniques, and animate entities (Franklin 2007: 6). The study of zooveillance emphasizes that biology is socially produced and always already culturally mediated in each situated encounter (*ibid*.). The North American model of zooveillance depicted in this section has transcended its regional properties and now serves as a model for captive animal management in other continents, as well as globally (Boyle, interview).

During most of the 20th century, the mission of zoos focused on a display of wild animals (Hanson 2002; Rothfels 2002; Mullan and Marvin 1987; Baratay and Hardouin-Fugier 2002; Friese 2009). In this capacity, the project of animal governance was usually executed within the particular zoo institutions, with little or no need for broader institutional communications. Since the end of the 1970s, however, a growing number of North American zoos have adopted a global conservation ethos, increasingly stressing their role in saving endangered animals and habitats. This orientation toward conservation seriously challenged the live animal trade that previously supplied zoos with animals from the wild (Hanson 2002; Rothfels 2002).

Simultaneously, many wild animals were reclassified as endangered, both by the ESA and by CITES (Braverman 2011a). As a result, accredited North American zoos adopted self-sustaining populations as a new priority, arguing that captive animals could be sustained over many generations by breeding, instead of collecting, wild animals (Friese 2009: 372). Self-sustaining zoo populations would not only keep wild populations intact, but could serve as a reserve for dwindling populations in the wild (*ibid*.). "[I]t is up to zoos… to buy time for wildlife," says William Conway (2010), previously director of the Bronx Zoo and a relentless advocate for transforming zoos into conservation institutions.

The term "surveillance" carries negative connotations. The context of captive animal governance offers a lens for thinking about surveillance differently. In this context, surveillance is essentially founded upon notions of care. Carmi Penny, TAG Chair and curator for the San Diego Zoo, suggests that the term "stewardship" better captures the mission of zoos. In his words, "Stewardship in this context is taking care of the resources and the planet that we live on. And frankly, it goes back to… the Old Testament: stewardship is what we were supposed to do with the earth" (interview). Penny believes that the notion of stewardship reconciles the zoo's dual, and often conflicting, missions of conservation and sustainability. "The term stewardship applies on both sides of the coin. You know, we support stewardship in northern Kenya. We also support stewardship in San Diego, by teaching those people how to be better citizens of the planet. And that's really what it comes down to, teaching people to be better citizens of the planet."

The zoo's twofold mission of sustainability and conservation is strongly intertwined through the intense interrelations between captive and wild animals. First, zoo animals are considered ambassadors for their threatened counterparts in the wild (Hanson 2002), and some even suggest that zoos have become the only place on earth where extinct wild animals still exist (Lukas, interview). Secondly, what is considered wild nature is changing rapidly. Surveillance technologies are not restricted to zoos but are also applied in parks and other "wild" habitats, quickly eroding the distinction between zoos and wild nature—or *ex/in situ*—in terms of animal governance.

Finally, by asserting that zoo animals share the same genes as their fellow species in the wild, the zoo can assert the authenticity of its animals and their accurate representation of nature "out there" (Friese 2009, 2010; Thompson 2002). At the same time, conducting scientific research based on genetics justifies the zoo's incarceration of these animals, which are portrayed as managed for the sake of their species. Beyond its function over the body of the animals and with regard to information that pertains to animal management, zooveillance is also performed over zoos as institutions. Based on biological and demographic assumptions, for example, SSP coordinators generate recommendations for every animal within their system—instructing zoos whether to transfer their animals to another AZA-accredited zoos and when to do so. Generally, these zoos comply with SSP recommendations or risk losing their accreditation (Braverman 2011a; 2012).

Administering Zooveillance: AZA's Governmental Structure

Accredited North American zoos collectively govern over one million captive animals. A complex network of committees, programs, and plans operate through the AZA—the central zoo industry organization—to administer this form of animal governance. The norms and procedures enacted by the AZA are negotiated among 225 different zoo institutions in the country. This section describes the functions of some of these administrative bodies and their complex interrelations.

In addition to the use of general animal records—first ARKS and now ZIMS—for making informed decisions about the individual management of *all* zoo animals, zoo professionals have been relying on species-based databases called "studbooks" for the management of particular species. A range of committees and programs draw on these studbooks to form specific decisions about the number and identity of zoo animals. Each collaboratively managed species is assigned a Species Survival Plan (SSP), which consists of a committee with volunteers from North American zoos directed by an SSP coordinator. Currently, there are 450 SSPs (Wiese, interview), "each of which is responsible for developing a Master Plan that identifies population management goals and recommendations to ensure the sustainability of a healthy, genetically diverse, and demographically varied population" (http://www.aza.org/species-survival-plan-program/, last viewed April 11, 2011). The SSPs determine which animals to breed (Friese 2009: 378).

A second important administrative body that manages the collective reproduction of zoo animals is the North American Taxon Advisory Groups (TAGs). The AZA runs over forty TAGs that are staffed by professional volunteers from across the zoo community (http://www.aza.org/animal-programs/, last viewed April 11, 2011). These TAGs oversee the administration of captive animals at the taxa level. Specifically, they determine which species zoos will manage collectively. Of the tens of thousands of species assessed, TAGs have chosen to collectively manage over five hundred species. They meet every three to five years to either create or update the Regional Collection Plans (RCPs) for each taxon.

RCPs identify "a list of species recommended for management in AZA-accredited institutions, the level at which each should be managed, detailed explanations for how those recommendations were developed, and an evaluation of how much space is needed for each species at each institution" (http://www.aza.org/taxon-advisory-groups/). Most of the animals targeted by TAGs for collective management by North American zoos are endangered and threatened. However, RCPs also recommend many common species for this form of collective zoo governance (Wiese, interview).

The Wildlife Conservation and Management Committee (WCMC) oversees this entire operation and is responsible for the formulation and communication of the various guidelines and protocols. The WCMC also serves as a conflict mediation and reconciliation body for issues arising within these programs" (http://www.aza.org/wcmc/, last viewed April 11, 2011).

Finally, these various entities rely on the work of the Population Management Center (PMC). Staffed by a handful of population biologists, the PMC is responsible for performing the detailed genetic and demographic analyses that are at the heart of the population management recommendations made by SSPs and TAGs. The PMC "ensures data accuracy, conducts genetic and demographic analyses needed to develop and distribute population management recommendations, determines the current and future status of the population, and identifies breeding recommendations" (http://www.aza.org/population-management-center/, last viewed April 11, 2011). AZA's website further indicates that, "These plans confirm population sizes needed to meet conservation and education objectives and guarantee that populations do not grow beyond our ability to care for them."

PMC experts use special data assessment tools—namely computer software such as ZooRisk and Vortex––to form their recommendations. Developed by Lincoln Park Zoo, ZooRisk provides a quantitative assessment of a population's risk of extinction due to the demographic, genetic, and management processes that affect captive populations. This assessment is based on "a population's history, the science of the biology of small populations and the ability to manage captive populations" (http://www.lpzoo.org/cs_centers_alex_software_zr.php). Similarly, Vortex is an "individual-based simulation model for population viability analysis," which models the "effects of deterministic forces as well as demographic, environmental, and genetic stochastic (or random) events on the dynamics of wildlife populations" (Miller and Lacy 2003).

Although seemingly stable and unproblematic, a closer look at the language of the programs reveals the fragility of such assessments. From Vortex: "it is important to recognize that many of the questions *VORTEX* asks as you construct your population model cannot be answered simply because the data do not exist. The only recourse that you will have is to enter your best guess" (*ibid*.: 1). The accuracy of the recommendations thus depends both on the quality and on the quantity of the data entered into the program (Wiese, interview).

In addition to its substantive problems, the software itself is also inherently limited, as illustrated in the Vortex Manual: "it is possible that after you spend hours working on a *VORTEX* Project, the program will suddenly crash. It is also possible that you will accidentally change a very useful analysis into something that is worthless" (*ibid*.: 9). The PMC's recommendations black-box social processes that are less solid than they are made to seem.

Despite the detailed human programming dedicated to the control of zoo animals, the solidity of animal programs is also contested by the animals themselves. Indeed, at certain points, the animal, in its physically embodied nature, may "kick-back" at its human programmers (Whatmore 2002). To the dismay of many zoo scientists, certain animals have "refused" to breed well, or to breed at all, in captivity. In some instances, zoos resort to a variety of techniques to encourage breeding, such as spraying hormone-containing urine or injecting hormones to increase arousal (Mastromonaco, interview). Some zoos in the United States are also training gorillas to conform to manual sperm collection, which increases the rates of successful reproduction. In another instance, five AZA institutions are collaborating to design a model for female cheetahs to choose their mates from a selected group of cheetah males. Providing the females with reproductive choice is expected to increase the likelihood of successful reproduction by 20 per cent (Boyle, interview; see also http://www.conservationcenters.org/, last viewed April 13, 2011). In response to its resistance, the animal is maneuvered by zoo people to participate in its own conservation. The process of complying or working around the animal's actancy (Latour 1987) also produces more sophisticated forms of surveillance. Not unlike in the context of human surveillance, in the animal context, too, resistance merely produces new forms of surveillance.

Comparing Animal Surveillance Projects

The project of governing populations through selective breeding is not unique to zoo animals. Most obviously, zoos have adopted studbooks and kinship charts from agriculture and pet industries (Friese 2009: 378). Moreover, AZA's goal of 90 per cent genetic diversity for 100 years is based on an assumption adopted from the context of farm animals (Reininger, interview). The reproductive control of captive and domestic animals shares a common history, uses similar technologies and, more recently, also strongly relies on genetics and includes forms of global surveillance (Haraway 2003; Derry 2003; Ritvo 1995; Franklin 2007).

But the reproductive projects of captive and domestic animals also differ in many respects. A first major difference lies in the purposes of these projects. For the most part, the breeding of domestic animals has been an aesthetic and financial pursuit (Ritvo 1995; Haraway 2003). Conversely, zoos perceive selective breeding of captive animals as motivated by wildlife conservation. Other purposes, such as the animal's financial value and the zoo's own survival, are usually seen by zoo professionals as relatively marginal in comparison to the protection of wildlife (Conway, interview), although in practice all are inherently linked (Friese 2009: 384). As Donna Haraway points out, the use of the term "survival" in the context of SSPs already exemplifies just how thin the line is between a secular crisis and a sacred apocalypse in American discourse (Haraway 2003).

Secondly, while domestic animals are "bred for perfection" (Derry 2003)—for creating super-animals, so to speak (Haraway 2003)—zoo animals are bred for the almost opposite purpose of enhanced genetic diversity, which is largely irrelevant in the domestic context. Indeed, selective breeding of domestic animals has traditionally focused on reproducing the desired physical traits of certain individual animals, symbolized through their lineage. Zooveillance, on the other hand, focuses on reproducing animals that embody certain genetic and demographic traits. This shift from the phenotype to the genotype denotes a new form of managing evolution (Friese 2009: 384).

Thirdly, reproductive scientists previously legitimized their work by producing animals, which was in line with purely demographic approaches. However, the animals reproduced today are evaluated according to the logic of genetic management. If an animal is genetically redundant, it will take up valuable zoo space without contributing to the diversity of the population (Friese 2009: 378). Consequently, certain zoo animals—the "generic tiger" (tigers that are inbred, crossbred, or otherwise not considered purebred) being a current example—are "bred for extinction" (Boyle, interview). AZA's Wildlife Contraception Center "helps scientists facilitate controlled pairings—a kind of high-tech matchmaking—while still allowing individuals to live in natural social and family groups" (http://www.stlzoo.org/animals/scienceresearch/contraceptioncenter/, last viewed August 15, 2011). Breeding to extinction, and extinction models at large, are largely missing from the domestic animal context. Strongly linked to the third difference, whereas captive animals are administered according to scientific models, domestic breeders usually reject such models (Haraway 2003).

Finally, domestic breeding is typically a process managed by individual and private breeders—who practice little centralized control and are subject to fewer regulatory impositions and administrative structures. On the other hand, the collective project of breeding certain zoo animals is subject to complex administrative and bureaucratic processes that derive their mandate and authority from the AZA. Various AZA committees make collective decisions about which animal species to include in protection programs, thereby controlling both the identity and the quantity of these animal populations. Despite its voluntary and unofficial nature, this form of governance seeks to create a pool of zoo animals that zoos can rely upon for institutional survival.

Conclusion

> One reason Wal-Mart has these little up to the minute electronic indicators now is that they know instantly when a shelf is empty and it helps start getting things on a truck far away . . . it makes everything more efficient, and you can plan ahead . . . [The same goes for managing animals.] [I]f we are not managing a population, you might just be looking at what's in front of you . . . So what we try to do is plan for the space. We ask everybody at the beginning of the year, or three years ahead . . . : How much space do you have? Who wants these [animals]?
>
> (Long, interview)

This essay identified three interconnected layers of zoo animal surveillance: elementary surveillance, dataveillance, and reproductive surveillance. Combined, these three layers form a heightened system of management that controls captive animal populations. I referred to the project of controlling zoo animals to conserve as "zooveillance."

The story of zooveillance is both ordinary and unique. Although it is a story about animals, it is remarkably similar to many other surveillance stories that are performed in a variety of human contexts, including the global passport regime (Torpey 2000) and public toilets (Braverman 2010a). Similar to the insights afforded by surveillance literature, the context of animals highlights the human obsession with classification in general and its manifestations in data-mania and with technological fetishism in particular. Ordering procedures everywhere are about reducing physical bodies into paper bits and computer bytes, organizing them into virtual numbers that erase their temporalities and physicalities and leave them fragmented. At the same time, this essay also illustrated that animal management cannot escape the physicality of the animal. Many zoo workers and visitors still come to the zoo to see Jojo the Lion and could not care less about the lion's genomic and demographic identity. Animals also have their way of kicking-back at their human programming (Whatmore 2002), an event that highlights their materiality.

Additionally, the essay demonstrated the increasingly dynamic role of technology within surveillance regimes. Extensive data administrations, centralized computer systems using sophisticated software—even transponders—are all used in various surveillance contexts. Both the importance of technology and its common usage highlight the interrelations between human and nonhuman surveillance and the possibilities of the one seeping into the other.

This essay also showed that zooveillance is a unique surveillance story. First and foremost, this project is unique because of the nature of animality. Throughout history, animals have performed the particular role of wild and other. Related to this otherness of animals is the human tendency to play god toward them (Sandøe *et al*. 1999), which manifests here in heightened classification schemes and in a powerful conservation ethos. Human dominance is also reflected in the zoo's management of the fragile and shifting boundaries between naming and creating zoo animals. Similar boundary shifts would trigger much greater debates if applied to humans. Zooveillance therefore serves to reinforce the perceived boundaries between human and animal.

Secondly, the project of zooveillance is unique in its underlying ideological drive. Conserving *in situ* and *ex situ* animals has increasingly become the central mission of accredited zoos in North America and the *raison d'être* for their institutional survival. In the name of their protection, captive animals are assigned committees and plans that further their intense management on a regional, at times even a global, scale.

Surveillance, this essay highlighted, is not always negative. In this context, it is driven by human care or stewardship toward animals.

Thirdly, zooveillance is unique in its complex administrative structure, which includes an intricate web of committees, extended processes, and detailed standards. Alongside SSPs, PMPs, and the PMC, there are also TAGs, RCPs, and the WCMC. AZA's various three (and four)-letter acronym committees and programs exemplify both the centralized and the dispersed nature of the zooveillance project. On the one hand, in the place of the panoptic Big Brother, an even bigger brother (here, the AZA's collective management of zoo species) not only controls but now also creates the surveilled subjects through an intensified control of their reproduction. On the other hand, in the place of this Big Brother, many little brothers (committees, programs) operate independently, creating numerous oligopticons (Latour 2005: 181), which do exactly the opposite from the panopticon: they see much too little to feed the megalomania of the Big Brother, but what they see (genomics, demographics, etc.), they see well.

Developed by North American zoos to collectively manage certain captive animals, the zooveillance model has become the gold standard for zoos worldwide, setting the stage for parallel projects of animal management by zoos on other continents and for a similar global administration of several dozens of selected animals (Boyle, interview). Under the international umbrella of the World Association of Zoos and Aquariums (WAZA), Global Species Management Plans (GSMPs) consult with international studbook keepers in the same manner that SSPs rely on regional studbooks (http://www.waza.org/en/site/conservation, last viewed April 11, 2011). The mini-ecosystem that has formed around the collective surveillance of North American zoo animals thus carries implications that lie far beyond its particular regional setting. Some of the interviewees have even pointed out that the North American model may soon become relevant for administering what is now considered wild nature but may soon be enclosed and controlled for its own protection. The various similarities and differences between human and animal surveillance make the project of zooveillance—and that of surveilling animals at large—deserving of a much more thorough exploration than it has received until now.

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