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Data flows and water woes: The Utah Data Center

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Abstract

Using a new materialist line of questioning that looks at the agential potentialities of water and its entanglements with Big Data and surveillance, this article explores how the recent Snowden revelations about the National Security Agency (NSA) have reignited media scholars to engage with the infrastructures that enable intercepting, hosting, and processing immeasurable amounts of data. Focusing on the expansive architecture, location, and resource dependence of the NSA's Utah Data Center, I demonstrate how surveillance and privacy can never be disconnected from the material infrastructures that allow and render natural the epistemological state of mass surveillance. Specifically, I explore the NSA's infrastructure and the million of gallons of water it requires daily to cool its servers, while located in one of the driest states in the US. Complicating surveillance beyond the NSA, as also already imbricated with various social media companies, this article questions the emplacement and impact of corporate data centers more generally, and the changes they are causing to the landscape and local economies. I look at how water is an intriguing and politically relevant part of the surveillance infrastructure and how it has been constructed as the main tool for activism in this case, and how it may eventually help transform the public's conceptualization of Big Data, as deeply material.

Keywords

Surveillance, data, water, new materialism, NSA, activism

Snowden's revelations

In late 2013, the National Security Agency (NSA) (Figure 1) opened its data storage center located in Bluffdale, Utah, dedicated to amassing Big Data for surveillance ends, in the US and beyond. The opening of the center coincided with a series of surveillance revelations sparked by (former NSA employee turned whistle-blower) Edward Snowden's release of classified documents to journalists at *The Guardian* and *The Washington Post* in June of that same year. At a moment when the public was being made aware of the scope of the agency's surveillance programs, designed to "intercept, decipher, analyze, and store vast swaths of the world's communications" (Bamford, 2012a), the center's construction was not uncontroversial (Hogan and Shepherd, 2015). Snowden's insights have drawn attention to the spaces, locations, and the infrastructure necessary for such large-scale surveillance programs to exist.

According to an interview with Snowden conducted by journalist James Bamford (for *Wired* in August 2012), the data center was internally referred to as the "Massive Data Repository," and later renamed to "Mission Data Repository" due to the intimidating nature implied by a focus on scope and frame, based on such a large scale. However, neither of these names stuck in popular parlance nor journalistic references to the center. Instead, the "Utah Data Center" would serve as the ongoing nondescript placeholder for the physical space where the NSA would house some of its surveillance activities. The site and infrastructure would remain epistemologically bound with the activities and politics of the NSA itself. In other words, the machine of surveillance and the perceived limits of human knowledge are rendered material and monumentalized by the data center.

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Figure 1. EFF public domain image of NSA Utah Data Center 2013 (Higgins, 2014).

The NSA was now part of the landscape. They've been building that facility as if they're going to stay forever. (Carroll, 2013)

Soon, even an open-air data center may seem archaic... A modular data center can be delivered to a site, powered up and begin processing data almost immediately. (Breeden, 2013a)

The Utah Data Center—while highly guarded and secret in many respects—is now a widely known entity since the Snowden revelations relayed and popularized by journalist Glenn Greenwald in his book *No Place to Hide: Edward Snowden, the NSA, and the U.S. Surveillance* (2014) and filmmaker Laura Poitras (2014), in her film *CitizenFour* (Sledge, 2014). The archive of documents about various NSA operations detailed the center's Big Data collection activities: the lives of Americans (and beyond) were being recorded and collected onto stacks upon stacks of servers, connected to computers capable of rapid and complex calculations. Despite these important discoveries, and consequences that expand to a global scale, not enough attention has been paid to the location of the center and the material–environmental consequences of their operations.

It might seem, at first glance, that the issue of geography and location—and in turn, mobility and modularity—is less pressing than the surveillance policy and privacy implications that have recently been made public. Focus seems to remain on government responsibility and complicity, and the privacy implications of wide-scale surveillance by various companies such as Facebook, Google, Microsoft, Skype, and Apple (Andrejevic and Gates, 2014). As users, we are increasingly involved and complicit with generating Big Data: for social media (Facebook, Twitter, etc.), through algorithmic queries (OKCupid, Google Search, etc.), for the quantified self (FitBit, Nike Run, etc.), and for geolocation (Google Maps, Yelp, etc.), and so on. These become part of the upward streams collected and mined by the NSA, in addition to metadata, text messages, Skype calls, drone signals, and so on. However, as I argue, location and land use—and data center infrastructure and water consumption in particular—are all interlocking issues that shape and inform the crux of surveillance from a new materialist perspective (Shove and Spurling, 2013). A new materialist framework is important for the ways it adjoins dynamic human and nonhuman materialities and considers the agency of matter against the dominance of data by machines by and onto the bodies it purports to track and archive (Coole and Frost, 2010; Dolphijn and Tuin, 2012; Parikka, 2010). Beyond quantity, measures, and geopolitical references, the materiality of water in particular becomes a matter of flows and leakages, of wetness, condensation, containment, and evaporation that mirror the haste and waste of the current surveillance state as informed by the NSA and social media corporations.

Data

It remains unclear why the NSA's main storage site—of boring architecture, presumably designed to be anonymous—is located where it is, as a base on an unmarked road off of Camp Williams Road, a highway outside Salt Lake City (Carroll, 2013). Guarded, with dogs and cameras, the data center is deemed off limits as highly protected federal property. To merely inquire about its location is nerve-wracking and quickly begins to feel like intellectual trespass. Post 9/11, and with ongoing US-led airstrikes and drone development and deployment, it is difficult not to imagine the site as somewhat exposed from above, a vulnerable target presumably all too easily watched or infiltrated from the skies (Bowden, 2013; Andrejevic and Gates, 2014).

According to *Forbes* (Hill, 2013, 2014), the Utah Data Center is a 1.2 million square foot enclosure sitting on close to 250 acres of sagebrush. But what does it do? There seem to be two stories about the data center's capacities and potential. On the one hand, proponents like Brewster Khale of Internet Archive[1] argue that digital storage is trivial in terms of cost, and as such, the Utah Data Center can and will likely store the endless streams of data it needs and easily adapt and expand to meet the demand. Similarly, NSA whistleblower William Binney speaks to the relative technical ease of such an endeavor that allows the center and its servers to be managed, fixed, and updated. Binney, a mathematician for the NSA for more than 40 years, also confirmed the scale of the project: in 2013, the Utah Data Center can "store data at the rate of 20 terabytes—the equivalent of the Library of Congress—per minute" (Carroll, 2013). Adjoining technological potential with human authority, journalist Glenn Greenwald further details the NSA's Director Keith B. Alexander's desire to not only "collect it all" but also process and correlate "it all" on an ongoing basis (Nakashima and Warrick, 2013). This means that the facilities are generated to adapt not only to the growth in communications but also to the whim and will of those at its helm. In both *CitizenFour* and *No Place to Hide*, Snowden is clear in stating that the NSA partner, the Government Communications Headquarters (GCHQ) in the UK, is also collecting such endless streams of data. Technologically speaking, it is "no big deal." This is a narrative also backed by James Bamford, longtime NSA commentator and documentalist. Bamford explains that data collection is an easy present-day activity, while the ability to code-break and for cryptoanalysis is something the center anticipates being able to do in the future, with supercomputers and a massive pool of data to cross-reference (Wray, 2012). For now, collecting everything for all time is the new archival fever, even if the details are murky when it comes to understanding just how much data is flagged, held onto, or deleted by NSA operators.

Building from this, the other story is about assessments of the Utah Data Center's size, as being relatively small for the data it aims to hold—too small for the purported data explosion, from capturing the live streams of internet communications, as well as cell phones, tablets, and other mobile devices. As noted by Bamford (2012a), the NSA's Utah Data Center has had to merge forces with the Department of Energy (DOE) initiative in Oak Ridge, Tennessee, that sought for years to develop the most powerful computer the world has ever known (as of yet lagging behind the Chinese and close in speed to Japanese supercomputers). This supercomputer would serve both a public interfacing science project and a covert and top secret NSA project, geared to break strong encryption and target-specific algorithms. As "raw" storage, the Bluffdale facility would then provide what it collects, on a rolling basis, increasing data flows as supercomputer processing speeds evolve. By Bamford's (2012b) estimates, 2018 is the target year for the completion of the "exaflop machine," which will mean the construction of another facility near Oak Ridge that will require the energy equivalent to 200,000 homes and 60,000 tons of cooling equipment. With these added details, the Utah Data Center can be seen to serve as the agency's central storage and data container, designed to be modular as though its natural surroundings were unlimited: "you can add clip-ons. There is plenty of land" (Carroll, 2013).

In addition to this perceived ever-expandability afforded by the open landscape, during the Obama Administration, the NSA has created a colossal network of backup hard drives ensuring that failure at one facility is easily recovered from another. The NSA spreads and duplicates storage across multiple locales, including in Georgia, Texas, Colorado, and Hawaii, with a sizeable expansion at its headquarters in Fort Meade, Maryland (scheduled to open in 2016). This $860 million 70,000 square feet of datacenter space in Fort Meade is estimated to require 60 MW of energy to run and makes huge demands on water; up to five millions gallons a day. This location would then detour wastewater ("gray waters") from the Little Patuxent River, for the purposes of cooling its servers (Breeden, 2013a; Hickey, 2014).[2]

Land use expansion in the US is conceived as a solution to the management of space, both virtual and physical, and Utah certainly affords plenty of it. However, given that Utah is a ''moderate'' to ''severe'' drought state,[3] and officially declared as part of the US's ''primary natural-disaster areas'' by federal officials in the winter of 2014, plans for expansion should logically assume both unlimited and unfettered access to electricity and water and relative stability in the environment. Required technological resolve will mean more efficiency—possibly greener modes for feeding the center the power it needs to propel and cool its servers—that nevertheless stands in contrast to the realities of the state's climate and its ability to deliver. In these accounts, and from the NSA's positioning in particular, there is little to no mention of the region's inhabitants, whether they are encouraged or displaced by centers that managed their—and others'—data. The region mostly comprises a large Mormon (Latter-day Saints) population, yet the religious and cultural influence of this group is rarely discussed in relation to the NSA's hub. While underexplored, a link to culture is potentially of importance in shaping the wider considerations of surveillance, as always already grounded in a place with its own historical trajectory and embedded notions of patriotism (Aid, 2009; Carlisle, 2014).

Instead, in the US, the location of large-scale server farms seems determined by a combination of elements: available space and land, proximity to airports and major roads, local tax breaks, post-9/11 security policies, cheap power, and existing power grids (Cubitt, 2013; Fish, 2014; Hogan, 2013). Utah's relatively low utility rates and other so-called favorable conditions made it so that they were getting ''the biggest bang for their buck'' by locating the center in Bluffdale (Semerad, 2013). Like others investing in Big Data and cloud industry, the Utah Data Center takes advantage of the socioeconomics of the place. In addition to the NSA's, the overall number and location of data centers are difficult to assess, a lack of transparency that arguably reinstates surveillatory motives and operations.

Because large companies generally remain secretive about their infrastructure, estimates about how many data centers exist in the world vary greatly. The often cited 2011 estimate made by Emerson Network Power is of approximately 500,000 data centers (spanning 6000 football fields), while *The Register* claims 3 million as a more accurate guess in 2012. And because growing technological efficiency (i.e., consolidation) would see the data center count go down, not up, these estimates remain shifting targets (Morgan, 2012). It is important then to reiterate that the Utah Data Center is only one of the many examples of the kind of infrastructure required to feed and track our online consumption habits. Since server counts are highly guarded, and said to be only an abstract metric of capacity, the water and electricity these centers pull tell a far more important story about the communities that cohabitate with these centers and the geopolitics of digital culture. In 2013, the Utah Data Center was seen to expend the same amount of energy as a city of 20,000 people, costing $1 million a month to run. From these numbers alone, we are reminded that there is a very material infrastructure in place, at once agential, impenetrable, and fragile—dependent on nature as it plows through its resources without credit to nor conscience of it.

Water

Most data centers in the US share numerous characteristics that have become normalized and which can be seen as a continuation of the long legacy of industry turnover. They are large infrastructures that take up a lot of space (often equivalent to several football fields). They locate in small rural towns. They consume the electricity equivalent to small cities. They use a discourse of innovation and an ''economy of scales'' argument to justify their consumption. They employ only a small number (if any) of local inhabitants (proportionally to the size and excluding construction contracts). They are proliferating at exponential rates. And, they do not function without water—millions of gallons of it each day.

The Greenpeace report, *Clicking Clean: How Companies Are Creating the Green Internet* (April 2014), identifies the three largest concentrations of data centers in the US: northern Virginia, North Carolina, and the Pacific Northwest. These rural places tend to offer low-cost power generated predominantly from coal, with a small percentage being from nuclear and ''clean'' power sources (Fehrenbacher, 2012). Located in rural areas, data centers arguably call less attention to themselves and risk less pushback from small populations. Large corporations also pay for various infrastructures that are intended to help other server-based companies ''set up shop'' nearby. So while communications technologies have long been privatized, these internet infrastructures are increasingly entangled in market logics that are making internet flows a utility to manage, like electricity and water (Gillespie et al., 2014).

For example, a furniture factory town turned Google server hub, the rural city of Lenoir (North Carolina) is home to 18,000 inhabitants and to upward of 50,000 servers. There, and at its Douglas County (Georgia) location, Google is attempting to reduce its water consumption by relying on flows generated by the recycling of the community's shower and waste waters (Metz, 2012). Google contributed to the Douglasville–Douglas County Water and Sewer Authority (WSA), which filters residential sewage and returns it to Georgia's Chattahoochee River, diverting 30% of the water for its server cooling (Metz, 2012). Similarly, the city of Northlake in Illinois invested in water pumps to supply Microsoft's massive data center in Chicago.[4] And, at a Dallas-area data center, digging a 1200-foot deep well was seen to be the solution to water consumption.[5] Wells, water pumps, and shared water treatment plants are each components of innovative codependences between public service and corporate need, which will very likely become a model for the future corporate internet infrastructure emplacements. This merger may render a public service more vulnerable, especially in light of what we now know officially: that social media companies participate—however unwittingly—in NSA surveillance and in surveillance under guises of their own. Just how this can be discussed or measured remains unclear when considered on a case-by-case basis, whereas the careful scrutiny of these sites as a phenomenon may hint at where our attention should be directed.

It would seem that many data centers are set up in conspicuous locations, where no efforts are made to effectively engage with the environment or to save and properly manage water and land. Near Maiden (North Carolina), Apple has purchased and installed 200 acres of solar panels to generate power for its iCloud service. The construction is on land that was otherwise residential or used for farming. Similarly, in Phoenix, a data center was constructed in 2012 on land that just six months prior was covered with alfalfa.[6] Little is divulged about the impacts of these plans, displacing corn, wheat, sagebrush, or alfalfa. Such a shift in priorities is rarely discussed for its social, environmental, and cultural implications, in favor of the ideal of progress as technological innovation. The argument is especially persuasive, if not complicated, when it is for "green" power alternatives. And yet, it is unclear what the land was "used" for before data centers are constructed: if it was farm land or unoccupied fields of flowers, how those ecologies and economies have been displaced, replaced, or rethought remains to be explored. Because of the material–immaterial reconfigurations afforded by data centers, concepts of "nature" and the "environment" can be seen as reinforcing the notion that they are there to simply serve and supply the surveillance machine.

In a less nostalgic framing, perhaps, similar queries emerge of postrecession urban displacements. Vacated malls are being converted to server farms, such as Fort Wayne's emptied Target store[7]; Jackson, Mississippi's former McRae's department store[8]; and a quadrant of the Marley Station Mall, south of Baltimore.[9] Urban and suburban locales are also being converted to data centers with very little scrutiny from the public, and yet these are issues that implicate everyone because of the enormity of the operations and their reliance on natural resources.[10]

A Microsoft data center in San Antonio is using 8 million gallons of water per month (Zahodiakin, 2014); similarly, for Facebook, higher temperatures demand more cooling, and this means more water despite their claims to have built their data center in Prineville because of its cool, high desert location (where temperatures in the summer still reach 100°F, which is far from ideal for server centers). Because economies of scale continue to dominate corporate discourses—such as afforded by the world's largest social media network—drain on natural resources is deemed acceptable and even beneficial. Facebook and Microsoft, as examples, are forgiven specific efficiency failures because of the innovations made at other sites, informing an overall greener posture, which indicates a desire toward sustainability (albeit often outside of the US). Other companies, however, like Twitter and Amazon, are criticized in the Greenpeace report for their complete lack of environmentally sustainable commitments; "matter" does not seem to matter in these systems supported by imaginaries of the cloud.

Together, these server center anecdotes call attention to an environmental performance whereby server centers are geographically and historically located and are a part of a much larger and hugely complex media ecology (Heise, 2002; LeBel, 2012; Mosco, 2014; Tuana, 2008). However, embedded in the green turn (and however failed) is the deeply problematic issue of making the environment both the problem and the solution. From a new materialist framing, we may ask instead where agency lies and which spatiotemporal processes favor these outcomes (Bennett, 2005, 2010). To this end, the Utah Data Center (and surveillance writ large) serves as a perfect site of new materialist inquiry because of its complex entanglements and generative boundaries that in and of themselves begin to unravel the limits of representational and material dualities and dichotomies (Parikka, 2010). In other words, while the physical realities of these seemingly invisible processes matter a great deal, new materialism is a framework that makes a deeper theoretical connection between water—how it is consumed, managed, and wasted—and the way unlawful surveillance is enabled.

The Utah Data Center is estimated to eventually use 65 MW of power and consume 1.7 million gallons of water every day to supply and operate its cooling and storage center needs (Adams, 2013). Because of pressure by journalists, the NSA has had to hand over information about its water usage, after claiming that the knowledge of its emplacement was a matter of national security and thus redacting details from public records (Reese, 2014). The records eventually showed that the NSA was in fact using less water than it had contracted for, pointing to the operations running at less than full capacity, due to both a series of electrical failures and the fluctuation of seasonal temperatures. Unprepared for data collection of that scale, the Utah Data Center suffered more than a dozen "meltdowns" which resulted in delays (Brodkin, 2013; Hogan and Shepherd, 2015), equipment damage, and severe operational budget losses (Gorman, 2013).

Once restored, the expected yearly maintenance bill, including water, is to be $20 million (Berkes, 2013). According to *The Salt Lake Tribune*, Bluffdale struck a deal with the NSA, which remains in effect until 2021; the city sold water at rates below the state average in exchange for the promise of economic growth that the new waterlines paid for by the NSA would purportedly bring to the area (Carlisle, 2014; McMillan, 2014). The volume of water required to propel the surveillance machine also invariably points to the center's infrastructural precarity. Not only is this kind of water consumption unsustainable, but the NSA's dependence on it renders its facilities vulnerable at a juncture at which the digital, ephemeral, and cloud-like qualities are literally brought back down to earth. Because the Utah Data Center plans to draw on water provided by the Jordan Valley River Conservancy District, activists hope that a state law can be passed banning this partnership (Wolverton, 2014), thus disabling the center's activities.

The geopolitics of water are explored here as both threat and supply, through bounty and drought, power and cooling, climate change, and pollution. Water becomes a medium by which these key values can be identified and taken apart in light of recent, and still urgent, surveillance concerns. In one of the driest states in the US, water consumption in Utah is not only a vital concern but has also become the best tool for policy makers and activists alike to resist the Utah Data Center's activities. Because of this, water has been dubbed the "NSA's Achilles Heel" by activists from OffNow.org who are taking a stand against illegal surveillance. It is understood to be the most effective legal material means to block the NSA's illegal activities, specifically in Utah but also as a joint effort with several other states.[11]

For example, as a gesture of provocative and preemptive resistance to mass information storage in its jurisdiction, California passed a bill, dubbed "the 4th Amendment Protection Act," that aims to prevent the state from providing material support or resources to any federal agency engaged in warrantless, illegal, and unconstitutional data and metadata collection (SB 828, 2014).[12] Activists recognize that while the bill has a "very high tolerance threshold," and is unlikely to significantly undermine the NSA's activities, it is of great symbolic importance because it literally attempts to dislocate surveillance activities. Potentially setting another important (albeit very specific) legal precedent, the fully actualized version of this legislative move would give individual states the power to turn off the water and electricity supplies on which huge server sites such as the NSA depend, interrupting the physical structures that subtend the agency's ownership of information (Mullin, 2014b).

Similar bills, all rooted in the 10th amendment,[13] have been recently introduced in Alaska, Indiana, Mississippi, Missouri, Oklahoma, Washington state, and South Carolina, though they have not yet passed in either Utah or Maryland.[14] To this effect, the website tenthamendmentcenter.com carefully documents and explains the "Anti-Commandeering Doctrine" as established in constitutional jurisprudence in 1842.[15] It stipulates that states do not have to comply with the demands of the NSA; or, more precisely, that the decision power rests with the states (and the people) rather than with governing bodies at the federal level. In actuality, this would mean that the federal government cannot force state or local governments to cooperate in enforcement or implementation as an exercise in its authority.[16]

In a 2007 ruling, the Yucca Mountain project (Nevada) set a precedent for this tactic of shutting off the water supply at the state level for a federal project. This project consisted of the construction of a repository on federal land to dispense of "high-level radioactive waste and spent nuclear fuel"[17] and was based on 20 years of scientific research by the DOE. The nuclear waste repository at Yucca Mountain was to be located approximately 1150 feet below ground surface, secured by multiple barriers. Debates about its closure, however, revolved around competing discourses: the Yucca Mountain project either did not meet EPA (Unites States Environmental Protection Agency) standards required of a nuclear waste dump (as argued by activists), or the decision was caused by "political maneuvering" (as stated at the time in *The New York Times*).[18] Seen as detrimental to Nevadans, environmental activists used the Anti-Commandeering Doctrine to make their case, and won. Such a victory, however, means that nuclear waste was put elsewhere: likely stored on-site at various nuclear facilities in the US, shipped abroad, or sunk. This deflection speaks more of the public's fear of all things nuclear—especially as it pertains to injecting toxicity back into the earth—than it does to a safe and viable alternative. Alternatives to the Yucca Mountain project remain outside of the bounds of this particular activist trajectory but nevertheless demand pause. In contrast, in the case of water consumption by the NSA, anti-surveillance activists are again using the Anti-Commandeering Doctrine based on the demands of data centers are having on natural resources. This might be inadvertently situating surveillance itself as a form of pollution, allegorical to the unsustainable on-site containers holding toxic waste. There is always spillover. Just how data gets contained is a question always reserved for an undefined future "over there," as activism uses displacement to make the issues visible while delaying the NSA's activities in the most effective and urgent manner possible.

To this effect, privacy advocates for the Restore the Fourth, a grassroots non-partisan movement formed in response to the Snowden revelations, "adopted" the highway leading up to the Utah Data Center, as a way to get closer to the facility whose politics they are protesting. Restore the Fourth-Utah took this opportunity of "picking up litter" along the highway to also carry picket signs condemning the NSA's overreach. Because, until Snowden, the NSA overreach had been increasingly made invisible by cloud technology metaphors,[19] the group used the publicly owned infrastructure of roads and highways to render the NSA's activities more concrete (Carlisle, 2014). Water may be the entry point and the most efficient cut off, but other services and utilities such as electricity, trash collection, and road upkeep would no longer be provided by any state or local agency should the bill pass (Mullin, 2014b).

Furthermore, in June 2014, a Greenpeace airship flew above the data center to further protest illegal spying by the NSA, and drawing attention to the diversity of opponents, concerns, and forms of activism. In this case, Greenpeace joined the Tenth Amendment Center and the Electronic Frontier Foundation who stood together against unconstitutional searches and tracking of Americans (Mullin, 2014a). The Tenth Amendment Center positions its website as a tool for helping citizens to be informed and act to protect their rights, while the EFF (Electronic Frontier Foundation) grades members of Congress based on their role in reining in the NSA. In addition to effecting state legislation, the sister site OffNow.org encourages local resolutions, corporate protests, environmental activism, and university partnerships as additional forms of resistance against the center's cooptation of the land and resources. Together, these examples of activism and resistance show that privacy and surveillance are deeply interconnected with questions of internet materialities as well as the impact on and affordances of the environments that contain/fail to contain data.

Flows and woes

Water is essential to human life and as such constitutes an important element of human history; water shaped where civilizations developed, settled, and grew. Water has long served as an important religious symbol, from the Jewish Tevilah to Christian baptism and the Hindu Kumbh Mela. It serves to cleanse and to purify, to wash away bodily ailments and pollution. It has the power to create and sustain life and to destroy it. Water can be sacred, holy, turned into wine. It can also be used for torture, forcibly ingested, used to alter body temperatures, for dripping, dunking, and drowning. Historically, water for human uses became increasingly hidden, controlled, and contaminated: it facilitated transportation and trade, served to demarcate imperialist boundaries, was part of religious ceremonies, propelled manufacturing, and—since the Industrial Revolution—manages waste and improves the material conditions of life for the few, complicating labor conditions for the many, and polluting the source for all (Chen et al., 2014; Miller, 2007; Sekula and Burch, 2010). Today, Americans alone consume so much water for various purposes that it would require 3.5 planets like ours to sustain these habits and modes of living.[20] Meanwhile, half the world's population is still without adequate access to clean water. Water is also (and simultaneously) the essence of what enables the explosion of our digital networked lives, largely by cooling the vast number of servers on which data is stored.[21]

Using a new materialist framing sees water as both a necessary public good and as constitutive of the very bodies that seek water to subsist. In particular, exploring the role water plays in the management of digital lives—most notably by cooling servers—draws attention to the material consequences of online consumption as well as mediated ideals of the future, in this era of the Anthropocene. However, rather than merely cooling the servers on which our digital data rests, water holds a poetic, a politic, and a philosophy about life: who gets to live it, how it is made manifest, recorded, and archived—the "oceanic feeling" inspired by the borderlessness and boundlessness of cloud computing (MacLeod, n.d.). These are further refracted in the many metaphors used to speak about the web, as the uncharted and deep ocean of data. From "upstream" networking, "surfing" the web, "streaming" media, and data "flows," to "phishing" attacks, "pirating" and "torrenting" software, and the "deep web," to the terminology of "blogs" and "vlogs" apparently borrowed from captains' logs, the web can easily be conferred as liquid: flowing not simply like water but as an untamed ocean.[22]

The huge amount of water currently required to manage our digital lives is inextricably linked to values we uphold, such as power and control, assumed to be inherent to Big Data and deeply rooted into the provisions of nature, while never fully committed to them. The landscape is being physically and conceptually altered by these values; hence, the Anthropocene

(Lewis and Maslin, 2015). Simply put, the Anthropocene is the notion that human impact on the environment is so great as to have altered the geological state of the planet. While potentially overstated here, the concept of the Anthropocene is important for the ways in which it draws attention to the interplay between water and the virtualization of digital lives through data. But it is also important for the ethical injunction it invites to think critically about human and material agencies at play (Zylinska, 2014). The Anthropocene is an epoch where the human has gone ''too far,'' having done irreparable damage, and in turn, having been irreversibly transformed in the process (Biello, 2015). In that logic lies a cruel paradox: water, while already in short supply to most humans on the planet, is being used in unimaginable quantities to quench the thirst of the machines on which human data is stored.[23]

Using the NSA storage centers as a key site of inquiry—currently, the third largest data storage center on the planet to date[24]—I expose its reliance on water to make a point about the materiality of surveillance more generally, and the impacts of mass tracking on the environment, onto which the human is largely overlooked in favor of the Big Data the collective body generates.[25] While we equip ourselves with mass surveillance capabilities and are complicit in continuously generating data, we are not cognizant of the fact that our tracked bodies exist within a material world: one that is slowly compromised at the expense of being watched, detailed, and archived, in bits and numbers. This view adjoins media theorists and thinkers who have documented the material turn in media studies more generally, exposing, among other things, links between social media and surveillance and questions of data control and ownership (Gitelman, 2013), the altered relationship between power and knowledge (and so-called conspiracy theories) brought on by information hyperproliferation (Andrejevic, 2013; Horning 2014) and materialist and new materialist concerns that complicate, on the one hand, tangible/immaterial dichotomies (Kirschenbaum, 2012), and, on the other hand, the complex notion of ''the environment'' to which it ultimately returns. Data centers are tucked away in mountain landscapes, made small in the plentitude of nature (Berland, 2005). By returning to the ecological basis of space and place, as anchors of land, water, and the environment, we can better confront the conflicting ideals offered by fragmented lives online and off. In this way, the archival impulse can be seen to further drive the Anthropocene—and not simply through the proliferation of data and server farms—but also for the seeming paradox between the rapid cycles of disposability built into the devices we use and the mass pools of data that the NSA in particular is investing into archiving and analyzing in the name of national security.

Given the precarity and vulnerability of both the fixed location (as target) and material infrastructure (requiring maintenance and upgrades), technological innovations point to the future of data centers as both mobile and modular. While this is highly speculative at this point, and not specific to the NSA per se, prefabricated units will soon travel as containers on flatbeds, and adapt to the needs of each specific site for a given time period, fluctuating with demand. Easy to power up, data centers will be able to process data almost immediately, migrate contents, and shut down their operations just as easily (Butler, 2013). The technology is not fully there yet, but its promises are. The advantage of modular server centers is that the facility would be self-contained and ''software-defined'' as to not ''rely on a large industrial infrastructure that could be vulnerable to physical or cyber-based attacks, or simply mechanical breakdown'' (Breeden, 2013b). However, mobile and modular deployments still engage in the framework of our current data infrastructures, seemingly overlooking innovations made at the level of data and memory. Virtualization, which involves ''partitioning a physical server into a number of small virtual servers''[26] with the help of software, further hints at the shrinking space required to host exponentially more data, eliminating storage and perhaps also its processing infrastructures.[27] To be clear, virtualization has nothing to do with any physical shrinking of storage or reduction in equipment but rather speaks to an increased efficiency of computational power that uses more of the available server space (Strickland, 2008).

The ongoing tension between space and data informs parts of the innovative process, further influenced by location, geopolitics, and temperature control—the incessant quest to heat (power) and cool media (Brunton, 2015; Starosielski, 2012, 2014). In Utah, the NSA could have presumably built its data center—which is said to serve foremost as repository—the way the Mormons have built up their archive—deep into Granite Mountain (Rose, 2007a). The Granite Mountain Record Vault sits under 700 feet of stone (quartz monzonite, not granite) where water is constantly managed, as it puts pressures on the walls, leaks, freezes, and thaws in the cave—and hydrates its workers (Rose, 2007b). Not a data center per se, because microfiche is still believed to outlive digital formats, this vault serves more as a point of contrast, alongside the inaccessible Bettmann Archive, buried 220 feet underground, in a limestone mine 60 miles northeast of Pittsburgh (Wilhelm et al., 2004). It shows that cooling preserves while heat propels (Starosielski, 2014). Because of the presumed dual service of the Utah Data Center, to store long-term and also to stream out data-on-demand, it rests in an easily manipulatable if not inherently unstable environment, determined by existing roads and underground–undersea fiber optic cable channels.

Currently, what data centers across the world seem to have in common is that they are permanent structures, merging with the landscape, relying on it, and altering it in return—doing their part in shaping the Anthropocene. Their huge size, and complex infrastructure, seems to imply permanence. However, something about their emplacements and seemingly unconsidered locations bring into question this desire for true permanence belied by the precariousness of the real estate arrangements and policy variables. Politically shaky and resource dependent, the Utah Data Center appears to be a testing ground of sorts—perhaps an unintentional one—but a site likely to be completely transformed as it confronts its own contradictions. The NSA may unravel due to activist pressures to shut off the water supply, which may in turn force them to innovate within the realm of their own secrecy: a slippery, shifting, if not invisible, reformation of surveillance.

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Notes

1. Brewster Khale is in a position to understand data collection of this scale, given that he has created the largest archive of the web, the Internet Archive and the Wayback Machine.
2. In a 2007 *Quincy Valley Post-Register* newspaper article, I found a reference to water coming out from data centers being ‘‘too clean’’ to run through the city’s wastewater treatment plant because it kills off bacteria necessary to the process of breaking down the solids in black waters.
3. ‘‘Utah Interactive Drought Monitor Map’’ (2014) Available at: www.plantmaps.com/interactive-utah-drought-monitor-map.php (accessed 26 November 2014).
4. See Miller (2008).
5. See Miller (2009).
6. Data Center Knowledge (2014) In Phoenix, the birth of a data center. Available at: www.datacenterknowledge.com/archives/2012/11/20/phoenix-birth-of-a-data-center/ (accessed 21 January 2015).
7. See Fitzgerald and Ziobro (2014).
8. See Carter (2014).
9. See Smith (2012).
10. These include refurbished buildings, such as one of Chicago’s former printing presses house, which is now one of the world’s largest data centers. At 1.1 million square feet, it uses as much electricity as the city’s O’Hare Airport. See: Data Center Knowledge (2014) World’s largest data center: 350 E. Cermak. Available at: www.datacenterknowledge.com/special-report-the-worlds-largest-data-centers/worlds-largest-data-center-350-e-cermak (accessed 26 November 2014).
11. The idea to counter surveillance activities by blocking off resources stems from various incidents that required material considerations. As documented by outspoken activists pushing forward these bills, the National Security Agency (NSA) maxed out a power grid in Baltimore in 2006, which had the agency seek out other locations.
12. CA Senate Bill 828 2013/2014 ‘‘California SB828 | 2013-2014 | Regular Session’’ (2014) LegiScan. Available at: legiscan.com/CA/bill/SB828/2013 (accessed 26 November 2014).
13. See: https://en.wikipedia.org/wiki/Tenth_Amendment_to_the_United_States_Constitution
14. See: http://tenthamendmentcenter.com/2015/01/23/utah-bill-would-turn-off-water-to-nsa-data-center/
15. States don’t have to comply: The anti-commandeering doctrine (2014) Tenth Amendment Center. Available at: tenthamendmentcenter.com/2013/12/28/states-dont-have-to-comply-the-anti-comandeering-doctrine/ (accessed 26 November 2014).
16. This same logic, albeit not without much confusion and debate, was used to legalize medical marijuana in numerous states.
17. The Yucca Mountain Project. Available at: esd.lbl.gov/research/programs/new/research_areas/yucca_mountain/
18. See Northey (2011) and ‘‘Nevada Beats Feds . . .’’ (2014)
19. See Hwang and Karen (2015).
20. See: https://www.edx.org/course/blue-is-the-new-green-ubcx-water201x#.VHSko1fF94o.
21. Considering that Facebook is now larger than any nation in the world, ‘‘digital lives’’ are critical to assess in relation to water.
22. See: VSauce ‘‘The web is not the net.’’ Available at: www.youtube.com/watch?v=scWj1BMRHUA.
23. See: http://www.anthropocene.info/en/home.
24. ‘‘The End Of Privacy’’ (2014) NPR.org. Available at: www.npr.org/programs/ted-radio-hour/265352348/the-end-of-privacy (accessed 26 November 2014).
25. Whistle-blower Edward Snowden himself might be the most extreme example of this—a disembodied presence that continues to foretell the NSA’s future through various tele-appearances. See: Here’s How We Take Back the Internet (2014). Available at: www.ted.com/talks/edward_snowden_here_s_how_we_take_back_the_internet?language=en (accessed 26 November 2014).
26. ‘‘What Is Server Virtualization?—Definition from Techopedia’’ (2014) Techopedia.com. Available at: www.techopedia.com/definition/688/server-virtualization.
27. Virtualization saves space by making a physical server use more of its computational power, where each virtual server acts like a unique physical device. It saves space by being more efficient, reducing the number of physical servers needed.

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