Rethinking Temporalities of Endocrine Disruptor Panics:
Anxious Time and Evolutionary Time as Multispecies Intimacy

Lauren O'Laughlin

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Committee:

Priti Ramamurthy, Chair

María Elena García

Louisa Mackenzie

Amanda Swarr

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Abstract

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Lauren O'Laughlin

Chair of the Supervisory Committee:

Dr. Priti Ramamurthy

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Queer studies, feminist environmentalisms and critical animal studies have come together in recent panic about the effects of endocrine disruptors on wildlife, but they have not adequately attended to the ways that temporality operates. This thesis argues that temporality is fundamental in the construction of difference surrounding sex, gender, race, nation, and species, particularly in these sex panics. In so doing, it performs close readings of early environmental feminist literature and recent news articles, TED Talks, and documentaries on the "feminization" of frogs in the U.S. and also in the Aamjinwaang First Nation. This thesis expands Alaimo's theory of *evolutionary time* (2012) and offers the framework of *anxious time*, a forward- and backward-looking temporality of anxiety and nostalgia that fixates on reproductive longevity of the species rather than present wellbeing. It argues that temporality can also be used subversively through a politics of imagination that recognizes our shared precarity with humans and non-humans alike.

The bald eagle has been a symbol of pride and prowess since it was adopted as the national mascot in 1782 (U.S. Fish and Wildlife 2007). Embossed on the official U.S. seal as well as on dollar bills and quarters, the bald eagle supposedly stands for everything "American." The reproduction of the bald eagle symbol is central to the maintenance of the "imagined community" of the U.S., as Benedict Anderson would say, that ties together people in service of the nation (1991). An unusually solitary animal, the bald eagle is an emblem of the independence and masculinity that our rugged forefathers felt as they "discovered" North America. Rugged creature that it was, the bald eagle was nonetheless placed on the Endangered Species List in 1967 thanks to DDT, a major endocrine disruptor used in the mid 20th century. Bald eagles were consuming fish containing high levels of this organochloride found in insecticides, rendering some bald eagles infertile and others so calcium-deficient that their eggs were too brittle to function (Carson, 2002; U.S. Fish and Wildlife Service, 2007). Rachel Carson, author of *Silent Spring* and trailblazer for environmentalists and feminists alike, knew that DDT was negatively affecting birds' ability to reproduce. Although the language of "endocrine disruptors" would not appear for another thirty years, we could already see the material ways in which endocrine disruptors acted as a threat to the nation (although bald eagles have been since removed from the Endangered Species List). In expressing concern about the effects of toxic chemicals, the biopolitical reality is that we have historically prioritized the futures of only certain species, in this case, the national mascot rather than, for instance, the fish who were more directly exposed to DDT in the first place. This continues to be true today. In this thesis, I'd like to shift the focus to those whose protection concerns are fundamentally different: those of the often invisible animals such as fish and frogs in order to see what kinds of temporalities co-constitute not just species, but also sex, gender, race, nation and ability.

Temporality is fundamental to thinking about environmental protection because it is always at play whether we attend to it or not. For instance, environmental protection efforts are often marked by an apprehension of future loss and a simultaneous nostalgia for a utopian time before environmental destruction. These temporalities are very important politically. As Elizabeth Freeman writes in her book *Time Binds*, "…[p]eople are bound to one another, engrouped, made to feel coherently collective, through particular orchestrations of time" (2010, p. 3). And while collectivity can be positive in building solidarity for environmental protection efforts, the temporalities marking many toxicity discourses are also quite violent. Attending to the ways that power functions in our conceptualizations of ecological crisis is significant because it gives us the opportunity to rework them. By examining precisely what is obscured by what Muñoz calls *straight time* (or normatively heterosexual and [re]productive time), we can see other worlds and futures, what Muñoz calls "futurities" (Muñoz, 2009; Freeman, 2010). We need to develop a more robust understanding of the unique temporalities at play in environmental protection in order to articulate queer ecological justice in the present, the past, and the future.

Overview

Placing temporality studies and feminist environmentalisms in conversation with critical animal studies in this project, I contend that in our discussion about the future of our environment, we articulate unique temporalities with human and non-human animals that have the simultaneous potential to reinforce and unravel the human/animal divide as well as norms about sex, gender, race, nation and ability. In this project, I trace several intertwined temporalities in recent sex panics surrounding endocrine disruptors: (a) what I call *anxious time,* that is, looking nostalgically to the past and anxiously to the future at once; (b) *reproductive futurism,* or fixating on the longevity of our species, which I adapt from Edelman (2004); and (c)

evolutionary time, subjugating non-human animals in time to protect our own futures, which I adapt from Alaimo (2012). After unpacking these temporalities, I argue that temporality can be used for subversive means, specifically through articulating a politics of *imagination* that recognizes our shared *creatureliness* with non-humans as vulnerable creatures.

At its core, this thesis provides is a new method for tracking how temporality operates in environmentalisms: *anxious time* signifies a toggling of temporalities, a forward- and backward-looking of anxiety and nostalgia that does not attend to the present moment. This is significant given that there is little work looking at these kinds of multidirectional temporalities thus far in queer studies and helps to articulate how temporalities are always multiple and interconnected. Secondly and more centrally, this thesis asserts that temporality is fundamental in the construction of difference surrounding sex, gender, race, nation, and species. I make this assertion through a discourse analysis of a diverse archive of texts: first, I analyze the genealogy of temporalities in historical environmental feminist literature from the 1960s to the 1990s, focusing on two seminal texts: Rachel Carson's *Silent Spring* and Theo Colborn's *Our Stolen Future*. I argue that the temporal framings of these foundational texts continue to inform our current conversations about environmental protection. Second, I argue that temporalities are essential to questions of subjectivity, focusing on blogs, news articles (including images and comics), and documentaries about endocrine disruptors affecting fish and frogs since 2000. In this, I argue that the representation of gender, race, and species is rendered cohesive by certain articulations of *anxious time* and *evolutionary time*. I focus on news stories about the feminizing effects of endocrine disruptors on frogs in the U.S., how endocrine disruptors have affected articulations of sovereignty of the Aamjinwaang First Nation Peoples and their non-human cohabitants, a 2010 TED Talk "The Toxic Baby" by Tyrone Hayes and Penelope Jagessar

Chaffer. I conclude the thesis by re-reading the same TED Talk through the sense of possibility and imagination, to see in what ways temporality can have subversive potential. I briefly turn to two other texts that articulate moments of possibility: a comic by Emma Holister and the Save Our Frogs campaign website.

Methodologically, I focus on U.S.-based popular culture because it is largely accessible to people in the United States and can have great influence over popular understandings of social norms. In line with other feminist epistemologies, this thesis is based in the premise that reality and identity are constructed phenomena that are reinforced and maintained discursively and through social practices. Following Foucault, I follow the premise that power is not held in the hands of specific individuals who "oppress" others (though I am not willing to forego that framework entirely) but rather than power is spread across various social practices. After all, Foucault writes:

> What makes power hold good, what makes it accepted, is simply the fact that it does not only weigh on us as a force that says no, but that it traverses and produces things, it induces pleasure, forms knowledge, produces discourse. It needs to be considered as a productive network which runs through the whole social body, much more than as a negative instance whose function is repression. (as cited in Jørgensen and Phillips, 2003, p. 13)

In this way, tracing the power can demonstrate how it has multiple possibilities, negative and positive. But I diverge somewhat from Foucault in terms of practicality; I maintain that by highlighting the problematic workings of some of these norms, we can actively *create* new knowledges and possibilities.

The question of context is, however, quite important. Although these discourses have emerged in different locations and times in the U.S, they have articulated and mobilized largely cohesive and linear understandings of time in an effort to effect environmental change. In this thesis, I discuss temporality in rather broad strokes, as existing everywhere and at all times. However, just as Grewal and Kaplan have described patriarchy as existing in "scattered hegemonies," conceptions of time do not operate in the same ways everywhere (1994). Individual and collective relationships to time vary based on region, culture, age, sexuality, class, ability and an infinite number of other overlapping factors. It would be remiss of me to imply that temporality in the endocrine disruptor panics I examine in the U.S. operate the same way *everywhere.* I focus on the U.S. because of its strange position as economically "advanced" yet constantly a step behind in terms of environmental protection as compared to other wealthy countries such as those in the European Union. I am interested in how these spatially variegated temporalities influence each other, but for the purpose of this thesis, I will focus primarily on the U.S.

Contextualizing Endocrine Disruptors

Before analyzing the discourses surrounding endocrine disruptors, it is necessary to historicize the conversation in the U.S. From the way that endocrine disruptors have been discussed in the news and books since the 1990's, one might presume that they are a recent discovery. However, information about the estrogenic effects of natural and synthetic compounds had been well established in the U.S. as early as the 1930's and, some argue that ancient civilizations were aware of the effects of various herbal preparations on what we now know to be hormonal processes (Marty et al., 2010 p. S93). Endocrine disruptors, which can be either naturally occurring or human-made, are known to interfere with the body's endocrine

system, "produc[ing] adverse developmental, reproductive, neurological, and immune effects in both humans and wildlife," of which intersex traits have been the primary focus (National Institution of Environmental Health Sciences, 2015). Commonly used compounds that have the potential to be endocrine disruptors include Bisphenol A (BPA) used in baby bottles; phthalates in plastic wrap, food containers, and children's toys; as well as estrogen supplements for Hormone Replacement Therapy for menopausal women and/or transgender individuals, or those estrogenic compounds in birth control pills (Environmental Working Group 2009). Estrogenic compounds are in many household items, from antibacterial soap to perfume to air fresheners to herbicides. Their ubiquity is often invisible for the general public and has recently begun to overwhelm concerned consumers (Prud'Homme, 2011). The question is: why the panic now? Although the existence of endocrine disruptors has been established long before the 1990's, information about the overwhelming presence of endocrine disruptors and their major effects on wildlife and humans is more recent. By framing endocrine disruptors as a new problem, we make the question seem more urgent. However, as we will see, many researchers and journalists want to historicize endocrine disruptors in a long history of environmentalist activism.

Queer Ecologies Literatures

In the fields of queer studies and feminist environmentalisms, there have been significant recent conversations about challenging sex normativity in environmental protection campaigns. For instance, Bailey Kier's article entitled "Independent ecological transsex: Notes on re/production, 'transgender' fish, and the management of populations, species, and resources" (2010) encourages us to reconceptualize normative notions of time at the evolutionary scale as well as the category of transgender in order to address ecological and social problems and to think more critically about our obligations to nonhuman animals and our environment (p. 306-

307). Similarly, Giovanna di Chiro's chapter in the *Queer Ecologies* anthology (2010) entitled "Polluted Politics? Confronting Toxic Discourse, Sex Panic, and Eco-Normativity" critiques the anxiety surrounding gender norms and reproduction in endocrine disruptor panic in mainstream environmentalisms. Her work asks us to think critically about how we can simultaneously protect the environment and non-human animals while resisting normativity (p. 224).

Building upon the work of Kier and di Chiro, Stacy Alaimo's 2012 article "States of Suspension: Trans-corporeality at Sea" posits *trans-corporeality* as a new materialist and posthumanist understanding of the human as deeply interconnected with the environment, focusing specifically on the sea. Alaimo argues that origin stories of humankind emerging from the sea continue to inform our relations with the sea and, secondly, toxins heavily inform human/non-human trans-corporeality. Similarly, Malin Ah-King & Eva Hayward's article entitled "Toxic Sexes: Perverting Pollution and Queering Hormone Production" (2014) discusses sex as a "dynamic emergence with the environment," as something that marks both humans and non-humans as vulnerable beings. Like many before them, Ah-King and Hayward express concern that in these panics about endocrine disruptors, we focus heavily on sex rather than illness and death. Nodding to environmental racism, Ah-King and Hayward note that toxicity is disproportionately concentrated in developing countries where chemicals such as DDT are not yet banned.

The importance of this thesis is that it pushes the growing collaboration of queer studies, feminist environmentalisms and animal studies to look more closely at *how time operates in questions of environmental justice.* It challenges us to think through and beyond the temporal frameworks that Alaimo and Kier have suggested their respective works about how time might be useful to understanding toxicity and animality. More than just highlighting temporality as a

useful framework to utilize, this thesis asserts that temporality is fundamental in the construction of difference around gender, sex, race, nation, and species.

Anxious Time *and* Reproductive Futurism

Many scientific discourses pathologize animals who have genitals, gonads and or chromosomes that are not distinctly male or female (a condition known as "intersex")[1], particularly when they have been exposed to endocrine disrupting compounds. The discussion of these animals as "freaky," "mutant," and having "teeny-weenies" (Environmental Working Group, 2009; Schweber, 2014; Dunn, 1998); the preoccupation with the potentially decreasing sperm count of males globally (Cadbury and Quarshie, 1993); and the anxiety about decreasing male to female sex ratios based on chemical exposure (Brown 2007) reify a pastoral utopia of the past, a prelapsarian time before endocrine disruptors.

Operating in what I call *anxious time* here means articulating concerns and compunctions about enacting potentially queer futures. I define *anxious time* as an antonym to what Muñoz calls *ecstatic time,* a queer method to think otherwise (2009, p. 32). He writes, that "[t]o see queerness as horizon is to perceive it as a modality of ecstatic time in which the temporal stranglehold that I describe as straight time is interrupted or stepped out of" (2009, p. 32). Specifically, in writing about fears of the increasing frequency of intersex births, researchers, journalists and concerned consumers operate in an *anxious time* where the present is only relevant inasmuch as it predicts the future, a future where humans fail to approximate the norm of dimorphic sex. *Anxious time* is fundamentally about the future impossibility of binary biological sex. In this way, *anxious time* in these discourses operates in tandem with what

[1] The previous term for this was "hermaphrodite," a term now seen as offensive when used to describe humans. Scientifically speaking, hermaphroditism signifies the possession of fully functioning male and female reproductive organs whereas intersex signifies the possession of a hybrid of organs, but does not consist of two fully functioning sets of genitalia.

masculinity studies has articulated as the 'crisis in masculinity,' or anxiety about failing to approximate the hegemonic norm of masculinity (Connell and Messerschmidt, 2005).[2] After all, anxieties about decreasing sperm counts and male births are simultaneously entangled with our fixation on maintaining a future through biological reproduction – what Edelman calls "reproductive futurism" – and hegemonic masculinities (2004).

In addition to increasingly fixating on the importance of male reproduction, the nostalgia in these toxicity panics is one that is not just pre-chemical but *distinctly* pre-intersex. Researchers and journalists concerned about toxicity frame the discovery of intersex fish as a new phenomenon and thereby create false origin stories for both intersex and, as previously discussed, for endocrine disruptors themselves. In all of this anxiety, there is not just an elision of but rather an explicit erasure of the existence of intersex humans and nonhumans. In other words, these discourses stir panic about the discovery of certain intersex animals without acknowledging that (a) there are many exclusively hermaphroditic species (Roughgarden, 2004; Avise, 2011); (b) feminist scholars argue that sex dimorphism in humans is constructed and not necessarily "normal" anyway (Fausto-Sterling, 2000), particularly given that biological sex is itself an assemblage that is influenced by genes, hormones and environment and can change over the course of the life cycle. Anne Fausto-Sterling argues that 1.7% of babies are born with an intersex condition (2000, p. 53). By reducing intersex to a symptom of toxicity, however**,** this particular iteration of *anxious time* erases the existence of non-normatively sexed bodies even before the advent of endocrine disruptors. *Anxious time* here seeks to prevent intersex in the first place.[3]

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[2] Hegemonic masculinities are always plural, though, and the common discussion of the "crisis in masculinity" obscures this plurality. This is, however, outside the scope of this paper.

[3] It is seems to be an eerie coincidence that dexamethasone was discovered in 1971 and became popularized in the 1980's. This drug was used to prevent fetal development of a kind of intersex condition known as congenital adrenal

In an effort to protect future [human] populations, we fixate on physical sex as it relates to capabilities of reproduction: the most basic biological capability of being a living creature, or so we assert. This is emphasis on reproduction is another marker of the *chrononormativity* of contemporary capitalist societies (Freeman, 2010). *Chrononormativity*, what Freeman calls "the use of time to organize individuals toward maximum productivity" is marked by heteronormativity (2010, p. 3). In particular, the "teleologies of living" are punctuated by specific heterosexual markers including childbirth, marriage, and death (Freeman, 2010, p. 5). This includes not just these major life markers and stages but the mundane schedules that 'good families' keep, such as going to bed early and rising early (Halberstam, 2005, p. 4). Halberstam writes that **"**… we chart the emergence of the adult from the dangerous and unruly period of adolescence as a desired process of maturation; and we create longevity as the most desirable future, applaud the pursuit of long life (under any circumstances) and pathologize modes of living that show little or no concern for longevity" (2005, p. 4). In these environmental discourses, we demonstrate reflexes of *chrononormativity* in our preoccupation with sustaining our lineages and our species as a whole.

It is important to note that this biological longevity is biopolitical; only certain bodies are asked to reproduce and others are advised against or even prohibited from reproducing. In an effort to encourage "healthy births," toxicity discourses feed into prenatal governmentality that place the onus of preventing intersex births on the mother. After all, "good" mothers should avoid consuming or using harmful products and should consult a physician to conduct prenatal testing. This is necessary because intersex conditions must be assessed early enough so as to allow enough time for drug interventions such as [off-label] dexamethasone use to take effect

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hyperplasia (Hayek et al., 1971; Dreger et al., 2012). Although I am interested in the potential correlation of increased in vitro use of "dex" with popular discourses about toxicity-caused intersex conditions, this remains outside the scope of this project.

(Dreger et al., 2012). Mothers who do not assess their fetus for physical "abnormalities" are often considered to be ill equipped for parenting. In this case, we see that *anxious time* continues to articulate intersex as something to be prevented in the first place.

It is also important to note that some women can never attain the title of "good mothers," even if they undergo prenatal testing and take all of the recommended vitamins; we see in the U.S. that incarcerated women and low-income mothers, many of whom are women of color, are discouraged from reproduction and are often closely surveilled to that end (Roberts, 1997; Chase, 2001). But even outside of those communities, Roberts writes more broadly that "[w]hite childbearing is generally thought to be a beneficial activity: it brings personal joy and allows the nation to flourish. Black reproduction, on the other hand, is treated as a form of *degeneracy*" (1997, p. 9). Many bodies of color and of differing ability are never quite able to sync with *chrononormativity* because they are not permitted to reproduce (due to physical differences or legal barriers) and are thus deprived of the "teleologies of living," the markers of productive families to go through marriage, childbirth, and raising a family. On the other hand, they may simply reproduce "too much," as is indicated by the hallmark image of the poor welfare mother with multiple children who is critiqued for her choice to reproduce in the face of economic adversity. In these two instances, we see that the biological longevity of the humankind is marked by strict systems of maintenance; *anxious time* articulates which futures are worth building and which are simply not.[4]

[4] The reproduction of humans is also very much entangled with the reproduction of non-human animals. This is not merely with regard to non-human animals used for food consumption, whose increased reproduction might lead easier sustenance of a larger human population. The reproduction of non-human companions is integral to the teleologies of living for humans, who can build relationships with animals as quasi-children and/or can add ease to their lives through using animals as therapy pets.

Time Across Species: Evolutionary Time

As with all human-animal relations, there is an intimacy at play in these toxicity discourses that is entangled with anxiety about the human/animal divide. In particular, the connection of human to non-human animals in these toxicity discourses is marked by unique understandings of time. Here I will apply the lens of what Stacy Alaimo calls *evolutionary time* to see to what extent we articulate time through and across species (2012).

We see in ourselves in the fish we study; this is what Neil Shubin calls seeing "your inner fish" in his eponymous book and TV show, because we share a number of physical characteristics with fish – we even have gill-like structures in the womb! (Shubin, 2009). Because we look through the lens of *evolutionary time* with animals*,* we can see in a single fish the expansive history we share with them and focus on our shared commonalities rather than our fleshy differences. Here we apply a kind of *allochronism,* or what is anthropologically discussed as the denial of the simultaneous existence of the observer and the observed by placing the observed in past time (Fabian, 1983). Alaimo asks the important question:

> If so many people resist or deny the idea of kinship between humans and other primates, is it possible for humans to embrace evolutionary origin stories that feature fishy mothers or fathers—or, more appropriately, an intersex aquatic ancestor? What sort of cultural work can aquatic ancestors perform? (2012, p. 480)

Unlike Alaimo, I find it significant to focus on the intersex characteristic of our aquatic ancestors. Non-human animals as 'ancient ancestors' perform not just a particular role as species but also are incorrectly seen as exclusively sexually dimorphic. By editing this narrative, we can more easily represent intersex as a pathology emerging specifically in response to toxicity.

The key element to note, however, is that *evolutionary time* is just as forward-looking as it is backward-looking. By using these fish as predictors of our future livelihoods (what many call "environmental sentinels"), we articulate fear that their development of intersex characteristics means that we, too, may be approaching sex-unstable futures if we proceed at the same rate of chemical and nuclear production. We situate our fishy companions as necessarily existing in a different time as us, as permanently pre-human, as if they ceased to evolve *with* us rather than *into* us. Because these fish are able to predict what will happen to us in the future, we deny the reality that we are *coeval* with these fish, to use Fabian's term (1983). That is, we exist in the same time as fish.

Temporalities that conceptualize of certain species as other do not merely exist at the site of ecological panics, however. The relegating of time to animals is a biopolitical process; those animals that are deemed worthy and grievable lives are given a future and a history. (Let us think about the ways that domesticated pets routinely make their way into family archives, sometimes dominating them. These pets' futures are often protected by healthy diets, hefty vet bills and staggering pet insurance premiums). The cows and steers in concentrated animal feeding operations whose estrogen-filled fecal runoff permeates the Chesapeake Bay are suspected to be a major cause for these intersex panics (Blazer, 2009). Yet we do not focus on the futures of these commodified farm animals. Instead, we focus on sea life such as fish and frogs specifically because they constitute environmental sentinels in our current environmental panics. We cared about the livelihoods of cows and steers with the emergence of bovine spongiform encephalopathy (commonly known as "Mad Cow Disease") not inasmuch as it threatened the future health of cattle, but rather because it threatened our own health.

In expressing concern for the futures of the frogs, fish and alligators in these endocrine disruptor panics, as scientific researchers have done (Hayes, 2003), one might argue that we are inching toward a more *coeval* transspecies intimacy wherein we recognize that we are living in the same time as these animals. Overall, however, this process actually reduces these animals into what Derrida calls *animots*, a play on the words "animals" and "words," rendering animals a mere figure of animality (2002). Here we may be coexisting with frogs and fish and alligators, but only with them as a figurative group of species rather than sentient ones with specific embodied experiences and needs. The question of care here, in other words the concern for mutual human/frog futures, is only seen in terms of human existence rather than quality of life. For instance, in expressing concern about the future populations of tree frogs, researchers such as Tyrone Hayes take a group of frogs, expose them to toxic chemicals, surgically examine their bodies for signs of "abnormality," and then dispose of them in an effort to predict the effects of toxic chemicals on future frog populations. Care for a particular frog (like a particular dog or cat or horse) as a sentient creature might not merit this kind of utilitarian process, but the futures of non-pets are almost always based on the population health of the species. It is uncommon to see the role of sentience in animals who can only be seen to exist as stand-ins for the whole population, first of their own species and then of humans.

In the next section, I will focus on a few key moments in panics over intersex wildlife to argue that these temporalities operate in ways that maintain systems of inequality but can also open up possibilities. First, I will (1) argue that Rachel Carson's groundbreaking *Silent Spring* (1962) and Theo Colborn et al.'s foundational 1996 pop science book entitled *Our Stolen Future* articulate unique temporalities surrounding *anxious time, reproductive futurism* and *evolutionary time* that not only mark the "start" of the environmental movement but also continue to inform

environmentalism today. Looking at the lingering affects and temporalities from Carson and Colborn, I will (2) provide an overview of temporal patterns in the emerging popular discourses in news articles and blogs since 2000, focusing on how reproductive futurism becomes tied up with sex, gender, race, nation and species. In doing so, I will conduct a close reading of the problematic temporal framings in a 2010 TEDTalk called "The Toxic Baby." Finally, I will (3) begin to read ways that these temporalities can be re-framed in liberatory ways through a re-reading of "The Toxic Baby" and two additional texts: a 2004 comic by Emma Holister on toxicity in fish and the website of an international campaign entitled "Save the Frogs."

PART I: Origin Stories, Founding Voices and Multispecies Intimacies

As I have discussed above, toxicity panics mobilize time in nuanced and complex ways to evoke panic in consumers. I am particularly interested in how these discourses operate in what Jacqui Alexander calls "palimpsestic time," that is, they continue to write upon each other in dynamic ways, often articulating origin stories of environmentalism to articulate environmental destruction as long-lasting, "like a parchment that has been inscribed two or three times, the previous text having been imperfectly erased and remaining therefore still partly visible" (2005, p. 190). These intertextual discourses are discordant, though, because, on the one hand, they harken back to early environmentalists to add weight to this problem and, at the same time, talk about intersex as a new emerging phenomenon that constitutes a new emergency.

In an effort to mark environmentalism as linear and progress-oriented, people recently articulating intersex panics use Rachel Carson as an indicator that endocrine disruptors are not a new phenomenon and that toxicity has been a problem for half a century now (Hayes, 2003; Hayes, 2010; Frogs Are Green, 2010). Although Carson's work was before the time of intersex panics, she continues to be rearticulated through contemporary intersex panic discourses. For

instance, Nancy Langston also refers to Carson as the original environmental whistleblower in her 2012 article entitled "Rachel Carson's Legacy: Endocrine Disrupting Chemicals and Gender Concerns," and in doing so, situates our current concerns in a longer history of environmental panics. Later, people would also take up Colborn et al. as a legacy of Carson, such as in the Canadian documentary *The Disappearing Male* (2008) and in articles such as those by The Audubon Magazine, referring to Colborn as the one who "sounded the alarm" about endocrine disruptors in the 1990's (McGrath, 2010). By seeing the way that Carson and Colborn et al. re-emerge in new discourses of environmentalism, we can see the way that past temporalities continue to inform our contemporary articulations of temporality. In other words, by tracking the way these temporalities have moved in the U.S. over the last fifty years, we can not only critique some of the problematic temporalities at play but also unearth some of the potentiality in the contradictions of the temporalities across time and species.

Silent Spring

Although numerous activists, scholars and activist-scholars alike have analyzed *Silent Spring* as a spark for the environmental movement in the U.S., few have looked at it in terms of temporality and more specifically transspecies temporality, which is significant because transspecies intimacy and temporality are central to Rachel Carson's project. Specifically, Carson's discussion of the harmful effects of the toxic chemical DDT is marked by *anxious time,* as the first pages of her book demonstrate, where she describes the beauty of a prelapsarian pastoral utopia: "There was once a town in the heart of America where all life seemed to live in harmony with its surroundings. The town lay in the midst of a checkerboard of prosperous farms with fields of grain and hillsides of orchards where, in spring, white clouds of bloom drifted

above the green fields" (2002, p. 1). Here Carson's flowery language paints the image of a bucolic town with seemingly impossible harmony.

Moreover, it is important to note that her utopia is centered around non-human life: "The countryside was, in fact, famous for the abundance and variety of its bird life, and when the flood of migrants was pouring through in spring and fall people traveled from great distances to observe them" (2002, p. 2). Here Carson not only articulates her anxiety about toxicity through the description of a nostalgic past, but she also marks the ways that animals punctuate the passing of time for us, filling our springs with chirping and our rivers with fish swimming upstream. Carson asserts that our futures and our futurities are entangled with animals by noting the way that they mark time for us. Then, as Carson's story goes, came the sudden fall: "Everywhere was a shadow of death… The birds, for example—where had they gone?" (Carson, 2002, p. 2). Carson herself notes that though this example is fictional, it might exist in many areas of the U.S. Her nostalgia*,* her articulation of loss, here is one that explicitly bemoans the loss of non-human life and recognizes the interconnectedness of human and non-human lives.

Carson's articulation of non-human animals is also marked by *evolutionary time.* As biographer Linda Lear writes, "Carson was interested in the long history of the earth, in its patterns and rhythms, its ancient seas, its evolving life forms… A fossil shell she found while digging in the hills above the Allegheny as a little girl prompted questions about the creatures of the oceans that had once covered the area" (2002, p. xii). She soon went on to study "those ancient fish" and sea birds "driven by ancestral instincts" (2002, p. xii). Situating animals as ancestral and perpetually in the past makes them an interesting way to understand ourselves. But Carson's articulation of living with animals is more nuanced. While, on the one hand, she

fetishizes non-human animals as "ancient," she also puts forth the radical notion that we simultaneously co-exist with animals.

Carson is quite clear about how important time is to thinking about environmental disruption: "Given time – time not in years but in millennia – life adjusts, and a balance has been reached. For time is the essential ingredient; but in the modern world there is not time" (Carson 2002, p. 6). Industrialization, she argues, is moving far too fast for our slowly evolving species to catch up. Slowing down is thus of the essence. Moreover, in Carson's mind, time is just as important for prevention as it is for diagnosis. After all, her work was particularly revolutionary because it noted the importance of seeing transgenerational effects of toxicity, that is seeing that toxins might be more insidious because their effects cannot be easily seen until later generations. Let us turn now to the way that Colborn et al. articulate similar temporalities.

Our Stolen Future

Theo Colborn et al.'s book entitled *Our Stolen Future: Are We Threatening Our Fertility, Intelligence, and Survival – A Scientific Detective Story* is also cited in news articles as a foundational text on endocrine disruption, almost like a second coming of Rachel Carson's *Silent Spring*. In their book, Colborn et al. mobilize temporality in ways that are in line with other endocrine disruptor panics that would soon follow, articulating *anxious time, reproductive futurism,* and *evolutionary time*. The title of the book alone, *Our Stolen Future,* is marked by anxiety and about future loss (one of the chapters is even entitled "Chronicle of Loss"). In describing our futures as singular, as a loss that we have in common, the authors seek to utilize this affective temporality in the way that Elizabeth Freeman describes it: to serve the purpose of binding people together, in this case against a common enemy. By articulating this collective fear, however, Colborn et al. ignore people who are already incapable of reproducing for

unrelated reasons or those who choose not to reproduce. In this way, *Our Stolen Future* articulates *reproductive futurism* when it discusses environmental justice being of utmost importance for our capability to reproduce.

For instance, Colborn et al. sensationalize the effects of hormone disruptors when they catalogue the effects of DES.[5] They offer the story of Andrea Schwartz, a girl overwhelmed with the desire to have children, but whose mother used DES during pregnancy: even at seventeen, Andrea "had always wanted children" when she got older and had been "captivated" when holding her baby cousin. In the telling of this story, her identifying quality is her desire for children. By following this with the declaration that "Andrea didn't have overly grand ambitions, she just wanted a happy, normal life," Colborn et al. equate biological reproduction with normativity, with the inhabiting of a so-called "normal life" (1996, p. 52). The last paragraph of the book opens with a similar sentiment: "As we work to create a future where children can be born free of chemical contamination…." and closes with the following line: "We owe that much, and more, *to our children* [emphasis added]" (1996, p. 249) While it is important that have the capacity to reproduce if they choose, I maintain that by articulating reproduction and longevity as being of utmost importance, we foreclose the opportunity to think through other livelihoods in the *present* moment. We exclude the possibility of thinking about wellbeing as anything but through biological reproduction. Moreover, we ignore the structural factors that shorten longevity for many people today.[6] In other words, when we focus on reproductive futurism in the face of systemic violence in the present moment, we ignore that reproduction is not encouraged

[5] Diethylstilbestrol, also known as DES, is a synthetic nonsteroidal estrogen that was given to pregnant women with the intention of preventing miscarriages (American Cancer Society, 2014).

[6] The murder of young black men by police officers around the country has come into the spotlight. The rising death tolls of trans women of color by police or suicide this year alone (2015) has raised serious alarm in queer communities.

for everyone and shift our focus away from the current realities threatening the longevity of many communities.

However, Colborn et al. brand a kind of reproductive futurism that seems unusual for its time in moving the focus away from cancer and toward the hormonal effects of endocrine disruptors. (Later, queer scholars such as di Chiro would ironically critique endocrine disruptor discourses for avoiding thinking about anything *but* hormonal effects). For years, Colborn et al. note, "toxic chemical" was equated with "cancer-causing chemical," but Colborn soon realized that she needed to broaden her analysis (1996, p. 19). The authors explicitly state that if *Our Stolen Future* were to have a "single prescriptive message, it is… [that] we must move beyond the cancer paradigm" (1996, p. 203). The authors write that "[c]ancer is a dramatic disease with devastating effects on its victims and their families. It poses little threat, however, to the *survival of animal and human populations* as a whole" (1996, p. 208). Here we can see that moving beyond the cancer paradigm means shifting temporal paradigms. Instead of focusing on the effect that cancer has on individual lives in the present, on the wellbeing of current bodies, Colborn et al. are asking us to think about the future *specifically in terms of our longevity as a species.*[7] Here we can look to the words of Muñoz, who argues that operating in *straight time* means articulating life in terms of biological longevity (2005).[8]

It is also important to note that Colborn et al. talk not only about human populations, but also animal species as needing to survive. After spending a greater portion of their book compiling instances of "unusual" animal behavior and development, Colborn et al. explicitly demonstrate the importance of thinking of animals as a proxy for humans. The authors argue that

[7] It seems odd that our fixation in terms of longevity would be on our capabilities to physically reproduce specifically because we have had and continue to have such a detrimental effect on our environment. In terms of human likelihood of survival, might it be so harmful to curb our reproduction rates?

[8] Though Muñoz does not specific the scale, presumably *straight time* is, too, working at the level of the collective, at the level of the human species.

"[n]o one dared ask whether synthetic chemicals might be having similar disrupting effects on human behavior. Those were treacherous waters they all preferred to avoid" (1996, p. 23). The exception to this, they note, was Rachel Carson, who famously said "[o]ur fate is connected with the animals" (1962)**.** The authors argue that we need to recognize our own shared intimacies with non-human animals if we are to fully come to understand the potential environmental destruction that these endocrine disruptors may enact (as cited in Colborn et al., 1996, p. 167). We must recognize our "our shared evolutionary inheritance and our shared environment" (1996, p. 167). In one particular passage, the authors devote time to think through human-animal relations:

> In examining our place in the evolutionary lineage, humans tend to focus inordinately on those characteristics that make us unique. But these differences are small, indeed, when compare to how much we share not only with other primates such as chimpanzees and gorillas, but with mice, alligators, turtles, and other vertebrates. Though turtles and humans bear little physical similarity, our kinship is unmistakable. The estrogen circulating in the painted turtle seen basking on logs during lazy summer afternoons is exactly the same as the estrogen rushing through the human bloodstream. (1996, p. 168)

Here we see how Colborn et al. do not think of animals in purely *allochronistic* terms, where non-human animals and humans will never exist in the same time period. Instead she sees humans and non-humans as coeval merely with some physical differences.[9] After all, she says, we all have the same hormones coursing through our veins.[10] Some non-human animals are

[9] I would like to argue that there is potential for intimacy beyond just shared physical structures (such as vertebrae) to other shared qualities. This is something that I will address in future work but which remains a question for the time being.

[10] It seems odd that Colborn et al. would focus on these hormones rather than other shared qualities. Why does she reduce our shared traits to that of our hormones rather than that of vertebrae that many others focus on? This appears to be just another indicator of the emphasis on reproductive systems that marks her analysis.

"sentinels" because they develop faster than humans and are able to show transgenerational effects of chemicals that Rachel Carson was so concerned with.

Colborn et al. maintain a hierarchy in the co-existing temporality that humans and animals share when they follow their passage about shared intimacy by talking about the importance of animal testing. On the whole, they exemplify the way that environmental panics continue to instrumentalize non-human animals for the wellbeing of humans. In other words, the care and concern that is usually articulated for non-human animals – even the bald eagle that opened this thesis – are often ultimately articulated to protect humans. It is one thing to see animals as similar to humans and to even assert the importance of the species' survival, but it is something quite different to assert that seeing our similarities with animals means we owe a degree of respect or, as "obligation," as Anat Pick has called it (2011). In this way, Colborn et al. reduce wildlife to an abstract species rather than sentient beings.

PART II: Sex, Gender, Nation and Longevity

Building upon the close readings of *Silent Spring* and *Our Stolen Future* through a close analysis on temporality and species, I would like to shift the analysis to a number of popular discourses that emerged in conversation with these foundational texts. Unlike Rachel Carson and Theo Colborn et al.'s accessible pop science books, though, the majority of discussion of intersex fish panics resided in academic literature in the 1990's. It is only in the mid 2000's that the panic of intersex fish and frogs entered the realm of newspapers and blogs.[11] These sources, perhaps partially due to the specific mediums they utilize, use evocative and even inflammatory language to render intersex bodies not merely abnormal but as distinctly new pathologies and as necessarily occurring as a result of endocrine disruptors. As we have already seen, news articles

[11] There are a few stories that emerged in 2002 and 2004, but the major wave of intersex panics in the news began in 2005 in the U.S.

talking about endocrine disruptors refer to frogs being "put in the gender blender" (Cox, 2002), intersex fish being "freaky" (Sutton, 2009) and "mutant" (Schweber, 2014), all of which use this language to raise a splash about how certain chemicals (often pesticides) can affect endocrine systems. Moreover, they conflate different categories such as sex, gender, and sexuality and thereby lump intersex in with all of the other 'social outliers', exaggerating the effects of endocrine disruptors and, in one fell swoop, reinforcing other systems of oppression. In doing so, they refer to a prelapsarian utopia before the advent of chemicals much as Carson does. Let us look at some specific examples:

An article appeared on the online National Public Radio (NPR) website in September of 2009 entitled "Gender-bending Fish Widespread In the U.S" (Joyce). In his article cataloguing the efforts of researcher Jo Ellen Hinck of the U.S. Geological Survey to track the number of intersex fish in various bodies of water in the U.S., the author strategically uses language to other intersex bodies. Quoting Hinck, Joyce agrees that this phenomenon is just "not normal" (2009) and his choice of the phrase "gender-bending" (his, not Hinck's) indicates a conflation of sex and gender and of a binary understanding of both sex and gender, separately. Moreover, it signals a broader degree of queer- and trans-phobia, as many different types of trans people identify as "bigender," "genderfuck," and/or "genderfluid," all of which are implicitly pathologized here in a discussion that is not actually about how fish identify or express their gender. Moreover, Joyce clings to the idea that intersex is a distinctly new phenomenon when he quotes endocrinologist David Norris of the University of Colorado. Norris, he says, "has been looking back in time to see when all this [intersex] started" (2006). Quoting Norris, Joyce writes, "[w]e have an analysis of museum specimens from 50 to 100 years ago, and if you examine them, we find that there's no evidence of any intersex" (2006). Regardless of whether one agrees with the politics of the

article, it is clear that this argument (as fully played out here as it is in the article) simply does not hold water. Without any evidence as to the museums assessed or the species of fish examined, a skeptical reader remains unconvinced. The fact that a well-established news source such as the NPR does not require more rigorous analysis here suggests not that the article is weak, but rather that this is a topic that appears to need no deep explanation. In other words, if readers already perceive intersex a new phenomenon related to toxicity, it needs to merely be alluded to as such from a person with appropriate credentials.[12]

Like Colborn, contemporary news articles emphasize the importance of *longevity* in terms of biological reproduction rather than in terms of mental and physical health concerns that threaten the life and well being of a person *as a person in the present.* To clarify, again, I do not suggest that we should forego concern about the potential reproductive effects that our production of new chemicals and our overflowing sewage systems are potentially causing. But I *am* concerned about how it is we are articulating the problem and how these discourses can be, at times, quite violent. In doing so*,* we shift away from what Giovanna di Chiro notes are more pressing concerns:

> the media fixation on gonadal deformities and sexual/gender abnormalities as the most treacherous concern ends up perilously de-emphasizing and, in fact, naturalizing and normalizing the many other serious health problems associated with POPs [endocrine disruptors], which are on the rise: breast, ovarian, prostate, and testicular cancers, neurological and neurobehavioral problems, immune system breakdown, heart disease, diabetes, and obesity. (di Chiro, 2012, p. 202)

[12] It is interesting to note that a more nuanced understanding of intersex v. hermaphroditism can be found among researchers such as Jo Ellen Hinck, but in the process of translating the research, news articles tend to fuzzy up the facts. Given the lack of specificity in other aspects of the article, however, this should not be surprising.

The fixation on intersex has demonstrated our change in priorities from the pre-Colborn era; since the official discovery of endocrine disruptors, we have begun to focus more on futures rather than on ephemeral presents/presence. That is, we have shifted from our focus on quality of life to biological longevity. All the while, it is clear that the fear that we articulate with regard to environmental destruction is one that is always rife with fear of disability – fear not just of the inability to reproduce but also on other physical conditions that move us out of the realm of "productive" bodies. In other words, even in those efforts we do make to focus on quality of life in the present moment, we often reinforce ableist understandings of wellbeing in the first place in our allegiance to *chrononormativity*.

It seems to me that this should not be surprising, however, because this is part of what *chrononormativity* critiques and, to a lesser degree in the U.S., more New-Age mindfulness practices that bemoan the hustle-and-bustle tempo of the modern work day. Slowing down time, however, does not have to be simply an exercise of re-centering oneself through meditation, but more simply, can be the radically queer and "selfish" act of thinking *beyond (re)production.* Queering time can more simply mean reclaiming time for oneself and for one's community now, rather than as something which is always owed to the next generation. Perhaps most importantly, it can instead mean a slowing down of time to attend to structural violence in the present.

It is important to note that wrapped up in discussions of (re)production are not just questions of ability, as alluded to above, but also questions of virility and masculinity, particularly as it is estrogenic compounds that seem to be wreaking all the havoc in the first place.[13] It is here that we see that *anxious time* becomes uniquely gendered. The documentary entitled *The Disappearing Male: Environmental Threats to Human Reproduction* (2008) directed

[13] It is worth noting that the Endocrine Disruptor Screening Program has recently started tracking androgens, too (EDSP 2014).

by Marc de Guerre released in Canada focuses on how endocrine disruptors are endangering masculinity as we know it. Though its location, medium, and audience are quite different, the temporality here is very much in line with other news articles emerging during the past decade and are worth unpacking. As the narrator says quite succinctly, "[s]ome chemicals are far more damaging to boys" (2008). This exaggerates the existing scientific literature about the effects of endocrine disruptors on male wildlife and implies that endocrine disruptors have no negative effects on women or other non-male identified people. Although most discussion of endocrine disruptors focuses on intersex and/or infertility in males, there is usually at least a peripheral discussion of the roles that endocrine disruptors have on *all* humans, such as increased risk for cancer. By focusing exclusively on males and their role in reproduction, this award-winning documentary reinforces the male bias in human health and the hegemony of masculinity over femininity.

Sperm counts, the narrator notes, are declining, with men today producing half as much sperm as their fathers, up to 85% of which is "abnormal" sperm (2008). The filmmakers continue to depict infertility as the greatest threat posed by endocrine disruptors by interviewing white couples struggling to conceive. Ultimately, however, this couple was able to have a child and just as the narrator says "The McGowens were finally able to conceive" we see a white baby smiling and giggling happily, explicitly demonstrating the positive value of reproduction (de Guerre, 2008). Children figure throughout the film as markers of the importance of family and reproduction, but only white reproduction appears to be valued. After all, there is only one family of color depicted in the film and they remain unnamed and silent. Intentionally or not, the filmmakers subtly but clearly demonstrate that the reproductive futures worth fighting for are

white and located at the center of economic privilege, for those who have access to new reproductive technologies.

In this film, Theo Colborn amends some of her past work in *Our Stolen Future* to make it clear what endocrine disruptors threaten: if exposed to endocrine disruptors during sexual development in the womb, "the boy isn't gonna make it to full manhood… in terms of what you want in a man" (as cited in de Guerre 2008). She, too, metonymizes man by the penis and in one fell swoop reinforces cis-normativity. And not only is he going to be 'underdeveloped,' but going to be "damaged forever," she notes (as cited in de Guerre, 2008). Anthropology professor Elizabeth Guillette echoes Colborn when she says "every child should be able to live up to their innate potential, whatever that may be, but we're taking it away from them." Pairing her comment with that of Colborn, Guillette has laid out for us what Muñoz and Freeman talk about in terms of *straight time* and *chrononormativity*, respectively, by emphasizing that a male's [heterosexual] "innate potential" is to produce offspring.

But *The Disappearing Male* is certainly not the only text that writes over previous decades of *anxious time* and *reproductive futurism* in terms of white able-bodied male virility and potential. A 2010 Santa Fe Reporter article entitled "Rise of the She-fish" expresses great concern about how chemicals are "feminizing fish" (Paskus, 2010). This language, however, implies that fish are all male except in the event of exposure to endocrine disruptors, signifying male bias even in animal science. Reproductive time is thus articulated in terms of *biologically male* reproductive time, focusing on penis size, testis composition, and the motility, volume and quality of sperm. It is for this reason that the alligators in Lake Apopka researched by the Guillette family have been dubbed as "teeny weenies" (Dunn, 1998) and that intersex frogs have been described as "Mr. Moms," where "'chemically castrated' guys develop into egg-laying

gals" (Raloff, 2010). In referring to fish as 'guys and gals,' we see that reproductive futurism carries with it heavily gendered connotations. Moreover, projecting the idea that fish and frogs have the same societal and familial roles that humans do, we again, anthropomorphize them in a way that denies their specificity as frogs and fish.

Aamjiwnaang Battles against Endocrine Disruption

Reproductive futurism is simultaneously implicated in race and nationality, however, as it is only *certain* bodies who are deemed worthy of reproducing. In the mid 2000's, the Aamjiwnaang tribe just north of the U.S. border in Ontario (also known as Chippewas of Sarnia First Nation) expressed concern about the decreasing number of male children being born in their community, which they suspected to be due to endocrine disrupting compounds. The sex ratio is almost 2:1 female: male, one of the highest ratios known worldwide (Mackenzie et al., 2005). Researchers Wiebe and Konsmo note that the discourses surrounding the Chippewas is also disproportionately focused on men, on the "lost boys," rather than also looking at the health conditions facing women in the tribe (2014). The Aamjiwnaang use similar language to U.S. reporters about the importance of maintaining reproductive stability for their future children, focusing on *reproductive futurism*. For instance, Ocala Star-Banner reporter Matt Crenson writes that "[w]ith every new baby, said Ron Plain, a member of the Aamjiwnaang environment committee, 'we have to worry what's the matter with that child, five years from now, 10 years from now, 20 years from now'" (2005).

Here, however, when it comes to indigenous populations sustaining themselves, reproductive futurism is rendered silly: Crenson, the reporter, writes that "[t]he Aamjiwnaang are getting increasingly worried and *obsessed* [emphasis added] about the pollution of their reserve," a reserve, it should be noted, that is only 4-square miles and is situated in the middle of what is

now known as the Canadian "Chemical Valley" (2005). The distinction between worry and obsession is significant, as worry can signify justified concern whereas obsession implies an exaggerated or unnecessary concern. The area is just ten miles from an ethanol plant, which is as far as it is from the reserve thanks to protest from the local Aamjiwnaang (Aamjiwnaang Solidarity Against Chemical Valley, 2015). Numerous children have health conditions from asthma to liver problems, suspected to be related to exposure (Aamjiwnaang Solidarity Against Chemical Valley, 2015). The Aamjiwnaang, however, note that the importance is not just reproductive futurism but the wellbeing of their children in the *present.* They express concern about the health conditions that their children are facing now, including asthma and liver disease and what, as we saw in the citation above, the *same child* will experience over the course of their life rather than fixating solely on the ability to reproduce (Crenson 2005).

Rather than examine the root conditions of the toxicity, Crenson notes that "[s]ome people have suggested that the whole band should simply pick up and leave the reserve for a less contaminated place," a suggestion that would hardly be made in any other city in the U.S. or Canada. Here Aileen Moreton-Robinson's work is useful, as she claims ontological belonging to the land as something radically indigenous: "[o]ur ontological relation to land, the ways that country is constitutive of us, and therefore the inalienable nature of our relation to land, marks a radical, indeed incommensurable, difference between us and the non-Indigenous" (2003, p. 31). The name "Aamjiwnaang" in itself is connected to the land as it means "at the spawning stream," signifying the rich relationship that this community has with its location on the St. Clair River and the local fish that populate it. To imply, therefore, that the Aamjiwnaang can secure their reproductive futures by simply moving away from the land they have long fought to maintain is a grave insult. In this way, we see that whether one has a "viable" argument for sustained

livelihood is deeply racialized, nationalized, and gendered. The Aamjiwnaang continue to struggle for their livelihoods as they launch a lawsuit against Shell Canada for a chemical spill that occurred in February of 2013 (Aamjiwnaang Solidarity Against Chemical Valley, 2015).

But the question of species comes into play here in important ways. The human inhabitants of Aamjiwnaang use animals as indicators not just to predict their own futures, but as evidence to the major polluters surrounding them that endocrine disruptors exist and continue to affect their lives. Even though they have consented to studies studying birth ratios (Mackenzie, 2005), the Aamjiwnaang people depend upon the lives of non-human animals to help justify the environmental racism they experience. However, it has thus far become clear that neither the human Aamjiwnaang nor their non-human companion animals count as worthy subjects, as their struggles against chemical industries in the area demonstrate (Aamjiwnaang Solidarity Against Chemical Valley, 2015). Though the Aamjiwnaang articulate reproductive futurism strategically to call for government and corporate accountability, their efforts make it clear that time is biopolitical. Just as the Aamjiwnaang fight for their survival and the survival of the non-human animals with whom they cohabitate, they are being continuously endangered by nearby oil refineries who are ironically creating a product intended to make [others'] lives more convenient by fueling the machines that *speed up* their travel time. Though endocrine disruption seems to be rearing its head most visibly in this area most likely due to the high levels of chemicals, the lack of respect towards the Aamjiwnaang through denying their right to a future signals a more insidious violence; instead of explicitly killing this community, chemical companies and the Canadian government are simply "letting die" as Foucault would call it (2003).

With reflections from the Aamjiwnaang struggles in mind, I would next like to demonstrate how temporalizing endocrine disruption is gendered, racialized, and species-specific

in a single TEDTalk.[14] The TEDTalk, entitled "The Toxic Baby," circulated on news media such as DemocracyNow! and on online blogs, signifying its wide appeal. On YouTube alone, it has had over 40,000 views since 2012 when the video was uploaded.

Silent Spring *to Silent Night: Toxic Temporalities Collide*

In December of 2010, Tyrone Hayes[15] and Penelope Jagessar Chaffer presented their lecture at TEDWomen entitled "The Toxic Baby" introducing Chaffer's eponymous documentary about the dangers of exposing children to common chemicals and connecting it to Tyrone Hayes' research on frogs' pesticide-related intersex conditions. I build upon the analysis of Giovanna di Chiro (2010), who argues that Hayes articulates "eco-normativity" in his previous lecture in 2010 called "From *Silent Spring* to Silent Night."[16] By situating his work in conversation with Carson's, he places his individual research into a collective of research on endocrine disruption that signifies the extensive effects that these chemicals have on the environment.

I argue that the eco-normativity that Hayes and Chaffer describe are marked by temporalities that have specific political effects which are palpable today and are, at the same time, in conversation with the previous environmental discourses preceding them. In this brief

[14] To provide context on the medium, however, it is useful to note that TEDTalks were popularized in the 1990s and offer short lectures on specific topics under the rubric of "Ideas Worth Spreading." Since 2006, the multi-annual talks have been available for free online viewing on Ted.com and have become popular among audiences far beyond the original participants able to afford a ticket to a conference (Heffernan 2009). TEDTalks are also currently available on Netflix and YouTube for easy viewing. TEDTalks have, become even further specialized due to their popularity, including TEDWomen and TEDYouth, which focus on specific issues related to each group.

[15] It is also worth clarifying that di Chiro examines what the embodied politics are of Tyrone Hayes being "one of only a handful of African Americans in the rarified field of endocrinology" (di Chiro, 2010, p. 212). It is also significant to note that his publication of his research on the dangers of *atrazine* led to Syngenta's lawsuit against him as a specifically racialized body. Hayes' situation in this talk is significant, too, as his position as a black man means that, in a way, he navigates both his outsider status (as a black man in a white field) and an insider of family norms (as a man with a wife and a child) in a way to present a cogent argument (di Chiro, 2010, p. 214). This analysis could extend to Penelope Jagessar Chaffer, too, who as a woman of color who is visibly pregnant, brings a certain embodied politics to her lecture on the importance of protecting future children from toxins. Because of the limitations of space here, I am unable to address the question of embodied politics fully but am interested in pursuing this question in future projects.

[16] That talk argues that feminized frogs are less vocal (soon leading to "silent nights").

18-minute presentation, we can see expressions of what I have called *anxious time*, articulated here not just as erasing queer pasts but also by reifying the importance of reproduction and family and articulating a need to maintain animal populations--*reproductive time*--and *evolutionary time.* In this example, I argue that attending to the multi-directionality of these temporalities and the multi-species effects of anxious time are fundamental to thinking critically about environmentalism.

Anxiety is quite palpable in this lecture. Within the first sixty seconds, a visibly very pregnant Chaffer bemoans the fact that we have between "30 to 50,000 chemicals in our bodies that our grandparents didn't have," many of which are linked to childhood illness (2010). In doing so, Chaffer refers to a mythical prelapsarian time before the advent of endocrine disruptors. Here, however, Chaffer obscures the fact that estrogenic compounds are normally produced and excreted by both human and nonhuman animals (Blazer 2009). Chaffer continues by rattling off statistics about the globally increasing rates of leukemia, asthma, autism and genital birth defects linked to the increased production of these chemicals, again signifying the importance of ability in our conceptions of wellbeing. In an effort to make the point that we need to regulate our consumption of estrogenic compounds in this new era, Chaffer obscures the existence of what scientists call a "baseline" of intersex births that occur even in the absence of endocrine disruptors (Bahamonde et al 2013). Referring more explicitly to this baseline would mean accounting for the many ways that a person can develop as intersex. Moreover, this narrative of eco-catastrophe creates little room to see these conditions as anything *but* pathology or to see things such as physical or mental traits as existing on a spectrum.

Hayes' portion of the talk is also marked by anxiety; he expresses concern about the "mass extinction" of species threatening 80% of amphibians, for which pesticides are a suspected

cause (2010). “We are losing species from the earth faster than the dinosaurs disappeared!” Hayes notes (2010). At the same time, he deploys *reproductive futurism* when he bemoans the intersex conditions these frogs develop and how these threaten frogs’ reproductive futures. For instance, Hayes projects an image of the gonads of a frog exposed to low levels of atrazine. After indicating that this one frog has developed multiple sets of testes and ovaries, he stamps a large red “NOT NORMAL” across the image (see Appendix). By pairing this with his fear about losing frog populations, he frames intersex as a pathology, as a marker of eco-catastrophe.

Some of the frogs who are born male, he notes, become female or become intersex through the development of eggs in their testes. All of this is just “not normal,” he says, “even for amphibians!” He laughs and the audience laughs, and the monstrous spectacle continues. This laughter is entangled with anxiety; it is a nervous kind of laughter that tries to make light of the sense of impending doom that marks the rest of this presentation. Hayes goes on to note that some of these male frogs with oocytes engage in homosexual behavior and he projects an image of two frogs engaging in intercourse. “These are just two brothers consummating their relationship,” he says (2010). The audience again laughs on cue, and we see the theoretical leap that Hayes makes here, collapsing intersex bodies, incest, and homosexuality all in one fell swoop and demonstrating that something as small as an endocrine disruptor has the capacity to evoke the ever-present norms about sex. If, as he notes, some of these intersex frogs are capable of reproducing, why do the queer sexes and sexual behaviors of these frogs even matter except that they *might* potentially signal other serious but different problems? In short, he says, atrazine is “*wreaking havoc*” (2010, my emphasis).

Moreover, by framing concerns about estrogenic compounds in terms of endangering babies and fetuses, Chaffer and Hayes not only depict endocrine disruptors as more serious of a

threat (they endanger the most helpless of beings, after all) but they articulate environmental concerns in a specifically *reproductive time* that reinforces the importance of biological reproduction. Lee Edelman has argued that political campaigns that use protecting babies as the central argument are "impossible to refuse" and thus usually on the winning side (2004 p. 2-3). It is for this reason that pro-abortion arguments also take on the language of "fighting for our children" that their enemies articulate (Edelman 2004 p. 3). On the other hand, "… *queerness* names the side of those *not* 'fighting for the children,' the side outside the consensus by which all politics confirms the absolute value of reproductive futurism" (Edelman 2004 p. 3).

By articulating endocrine disruptors and related increases of illness to a linear timeline of pre-endocrine disruptors, current risks, and potentially debilitating non normative sex and sexual futures, Chaffer and Hayes ultimately mobilize *anxious time* as an argument for increased self-governance over which products to consume in order to protect ourselves and our environment. Because the U.S. has not yet banned BPA products, as Chaffer notes, we are left merely waiting for regulatory changes from federal institutions in the U.S. In the meanwhile, Chaffer implies, the onus is upon us to inform ourselves of the number of chemicals we are exposed to on a daily basis. The livelihoods of our future children and the status of humanity hang in the balance.

But there is an important way that temporality plays into the specifically human-animal interface here. It seems quite odd that in order to talk about the health of babies, we should turn to frogs. (Even Chaffer says that her collaboration with Hayes surprised her). Like many other environmentalists, Hayes articulates frogs as "sentinels" to demonstrate what our human risks might be. "In part, amphibians are good indicators and are more sensitive because they have no protection in the water –no egg shells, no membranes, and no placenta," he notes (2010). Frogs

and fish become "canaries in the coalmine,"[17] an expression in itself that is wrapped up with non-human animals literal and metaphorical burden of predicting the futures of human wellbeing. We discuss fish and frogs as having futures that are always just before ours – their greater susceptibility to endocrine disruptors means that they can predict our futures. However, as the canary in the coalmine expression demonstrates, their early demise is often deliberate. That is, just like the canaries carried down to the coalmines, we often intentionally immerse fish and frogs in endocrine disruptors to help predict what will happen to us. Moreover, the ability of fish and frogs to mutate and often still be able to reproduce might mean that their futures are more stable than our own – who is to say that our superior and evolved selves will outlive the fish?

It is worth noting that Hayes specifically deploys *evolutionary time* when he describes the placenta as an "*ancient* structure that separates us from other animals [like amphibians]" (2010, my emphasis). By juxtaposing mammals and amphibians here, Hayes reinforces the Great Chain of Being, explicitly demonstrating how humans are more evolutionarily sophisticated than amphibians. Hayes' discussion of the long history of the placenta in mammals, however, adds another layer to this Chain of Being, showing that the divide between humans and amphibians was established long ago.

Chaffer plays upon this politics of time in her documentary by depicting the placenta as a border guarded by two balding, grey-haired white men who must give verbal permission to every substance passing through the placenta. As the phone rings, one answers with a creaky voice asking the respondent to repeat themself and the other falls asleep, prompting the still-upright guard to blast his partner awake with a foghorn. Now faced with new chemicals that even the

[17] The expression comes from the caged birds that miners would carry down into the mine tunnels with them. If dangerous gases such as methane or carbon monoxide entered the mine, the canaries would be killed first, signaling to the miners to evacuate.

vetted placenta guards (implied by their age) are unfamiliar with, embodied by a quickly speaking high-pitched voice through the telephone, they merely scratch their heads and let the chemicals through. But Chaffer's comical representation of aging and disability here draws upon ageist and ableist tropes to convey her understanding that our evolutionary defenses are in danger. Her choice of using two white figures in an office is curious, perhaps a subversive critique of the implied whiteness of so many medical discourses today. It could also be read of a critique of the reality that most biomedical discourses and chemical regulation are still headed by white men, who are clearly in need of work. Through this representation, Chaffer and Hayes remind us that because evolution is slow, we cannot expect our bodies to adapt quickly to the recent and unknowable chemical onslaught.

Here it is worth noting that Chaffer and Hayes do something contradictory and important. On the one hand, Hayes talks about the ways that non-human animals are evolutionarily prior to us and on the other, he and Chaffer talks about the placenta as also ancient, as incapable of keeping up with the speed at which toxic chemicals are being produced. In a way, they also imply that we are all evolutionarily backward in the face of endocrine disruptors. Rather than underscore the human/animal divide, this shared "backwardness" might also be a moment of shared intimacy, a time in which both humans and non-human animals are surpassed by endocrine disruptors. They do not, however, fully articulate this possibility, but it is a glimmer of possibility worth noting. In the next section, I'd like to examine how we might articulate other possibilities through reframing our understandings of time and thinking through longevity, futurity and queer time. In doing so, I will re-read this TED Talk as well as examine two other texts -- a comic about intersex fish and a campaign entitled Save the Frogs -- for their imaginative potential.

PART III: Queering Time and Thinking Otherwise

In her introduction to *Strange Futures: Futurity, Empathy, and the Queer Ecological Imagination* (2013), Nicole Seymour argues that we must push for new queer articulations of futurity that do not foreclose the importance of *longevity,* a distinction that is important to make (Edelman 2004, Halberstam 2005). Futurity, which is marked by the longing for new possibilities is unlike the notion of longevity which we have been discussing thus far, the ability of a being or an entity to be sustainable over a period of time or, in this case, biological longevity of being able to exist continually as a species. Specifically critiquing Halberstam, Seymour argues that 'queer time' is far more expansive and has the possibility for future-oriented environmentalism.

> While I do not want to suggest that "queer time" is anti-environmentalist per se, the fact remains that a mindset that connotes "concern for longevity" as heteronormative leaves environmental concerns floundering. Indeed, while Halberstam's point about longevity is spot-on in terms of social norms and the logic of capital accumulation, it is off-base in conservationist, environmentalist, and even certain economic terms…. (2013 p. 8)

In short, Seymour argues that 'queer time' might indeed be useful to thinking about environmentalism and the importance of attending to the livelihoods of both humans and nonhumans in times of ecological crisis (2013 p. 10). She agrees when Muñoz argues "that the future is, and still must be imagined as, queer stuff" but that those futurities can also be simultaneously sustainable and queer (Shashani 2013 p. 546). Although 'queer time' is not a stable phenomenon, the idea that queer temporalities are only ephemeral and fleeting is a misrepresentation of the potentialities that queer understandings and experiences of time hold. By placing Muñoz and Seymour in conversation and adding Carson into the fold, we can

approach something that sits between longevity and queer ephemerality, something that can encompass both modes of existence.

Queerness, Muñoz notes, is "an ideality" "not yet there," something that keeps us looking for a better existence (2009 p. 1). Through the hermeneutics of hope, he writes about queerness as a "temporal arrangement in which the past is a field of possibility in which subjects can act in the present in the service of a new futurity" and of queer futurity as attentive to the past in order to critique the present (2009 p. 16). In order to think queerly about what ecological justice might look like, I would like to propose *imaginative time* as a political methodology. Here I draw upon Seymour's work, where she describes imagination:

> Imagination"… has great resonance for queer ecology… since humans cannot always see the consequences of their actions on the environment immediately, nor the intricate interrelationships among all components in an ecosystem, they must be able to *imagine* them in order to act empathetically and ethically. (2013 p.12)

Imagining the livelihoods of non-human animals is indeed one of the first steps to articulating creaturely eco-justice. *Imaginative time* means imagining what the livelihoods of non-human animals might look like as a result of exposure to endocrine disruptors.

Rather turning to rights-based discourses which seek to reify the liberal subject, in this case the intersex human or non-human animal, I think we need to turn first to our shared "creatureliness," as Anat Pick would call it, not as rights-bearing subjects but as precarious fleshy inhabitants of the same planet (2011). I want to suggest that *creaturely poetics* help to demonstrate our proximities with non-human animals. This is what Anat Pick calls attending to the bodily and embodied shared vulnerabilities of humans and non-humans alike. Enacting a creaturely poetics means not only attending to the animality that "lurks within the human itself"

but also looks to non-human embodiment as having the potential to interrupt "institutionalized speciesism" and provide an alternative to the failings of anthropocentrism. Most significantly, though, "vulnerability offers a fundamental challenge to liberal humanism, both in terms of the rejection of the notion of rights and in a radical critique of subjectivity" (2011, p. 16).

Imaginative Time in "The Toxic Baby"

There are some odd things happening in "The Toxic Baby" TEDTalk that are worth examining if we are to articulate alternate care ethics. After Hayes' cracks a joke about the bizarreness of intersex frogs' gonadal makeup, he makes what I find to be the more interesting joke: "My wife tells me there is nothing more painful than childbirth," he laughs "… but I would guess that a dozen chicken eggs in my testicle would probably be somewhere… in the top five" (Hayes and Chaffer 2010). [18] The temporality of the *would be* - the realm of imagined – can, as we have seen, operate as a violent *anxious time,* but it also has the potential be a mode of resistance. By exaggerating the frog's potential discomfort by comparing frog oocytes in frog testes to the large *chicken* eggs in the human testes, Hayes is making an absurd comparison. Instead of saying "it might be uncomfortable to have human eggs in my testes," which are quite small, by comparison, Hayes renders the scenario monstrous in its size and its chimerism. This has two potential effects on the viewer: on the one hand, making this suggestion depicts intersex as unknowable, something which doesn't already exist among humans. On the other hand, the act of exaggeration evokes discomfort on the part of the viewer to *imagine* what intersex might feel like for a frog. Responding to Hayes' second joke, the audience laughs on cue, signifying another moment of anxious laughter. Although problematic in its conflation of toxicity and

[18] I should note that the assumption that oocytes in male frog testes are akin to chicken eggs in a human testis is an exaggeration and, in fact, many male frogs have oocytes in their testes as a part of sexual development (Bahamonde 2013).

intersex, I'd like to read it as a kernel of potentiality, as a potential step toward developing more complex interspecies intimacies.

After all, Hayes is asking the radical question of what it means to attend to the life of a frog: What is the wellbeing of a biologically male frog with oocytes in his testes, as Hayes begins to ask? How might the process of removing this frog from his habitat and "humanely" slicing open his testes be a refusal of our shared creatureliness? I am concerned that the utilitarian approach of exposing a frog and a group of frogs to high doses of endocrine-disrupting pesticides is not a creaturely ethics that thinks beyond the wellbeing of a species to the sentience of individual frogs, but Hayes does not address this question in his discussion.

What is even more odd is that this whole discussion is a digression from Hayes' main argument about *reproductive futurism*. If the frog whose gonads are projected onto the screen is merely an indicator for forthcoming future human intersex, then what does the lives of frogs matter? Through his hinting at the sentience of animals, Hayes is making a radical suggestion. Might the future we envision not merely be one where we care about human livelihoods but more broadly to think about other species' livelihoods? The anxieties of population maintenance of non-human animals are, then, linked to the anxiety that humans have about the murkiness of the human/non-human divide in the first place.

Chaffer does something similar in her documentary where she tries to imagine what a fetus is exposed to in the womb.[19] She imagines that a fetus is speaking to her through amniotic fluid saying "[t]oday I had some octyphenols, some artificial musks and some bisphenol A. Help me" (Chaffer 2010). Here, like Hayes, she is visualizing what non-verbal beings might say to us about their exposure to chemicals. Though limited in its articulation, we can read Chaffer's work

[19] I say "similar" here because I understand the controversy around comparing animals to fetuses, but in this case, I focus on the similarities of them as beings who do not communicate with humans, at least in ways we can understand.

in conjunction with Hayes' as a deployment of imagination to think differently about environmental justice.

Imaginative Time in Emma Holister and "Save Our Frogs"

To look for another kernel of imagination in intersex panics, let us examine at a comic created by Emma Holister and published by the National Health Federation[20] alongside a news article on endocrine disruptors in drinking water (See Appendix). In the comic, we see an investigative journalist (who looks like Holister) holding up a microphone to a group of ambiguously gendered humanoid fish who, oddly enough, appear to be walking around on their tails. The fish pictured here appear to have evolved because they are able to stand on land, breathe air, and speak in ways comprehensible to humans. One of the fish responds "…. I'm just swimming along, minding my own business, and then woa! Next thing I know I'm a girl! You guys are flooding our habitat with hormones and we're all turning into girls! Whatever happened to consensuality?!" (2006). With scales, visible breasts, and full beards, the other humanoid fish critique Hormone Replacement Therapy (HRT), holding picket signs saying "Say no to HRT!" and "HRT is not a fish's lifestyle choice!" (2006). So while these fish are on the same ground as humans (literally in this picture), their picketing demonstrates always still behind humans in time, because the toxins that humans dispose of unsafely affect them first.

Before continuing, I must point out the serious issues with this comic. For one, it exaggerates what happens to fish exposed to endocrine disruptors because generally the sex changes among fish are invisible to the naked eye without surgical examination. Moreover, it renders intersex and non-normative gender presentation as absurd by describing it as a pathology resulting from excess hormone exposure, as something that did not exist pre-HRT, and the comic asks readers to resist using HRT. HRT, it should be noted, is necessary for a number of reasons,

[20] The NHF is a CA-based lobbying group that promotes alternative medicine.

including menopause and gender affirming treatment. To imply that HRT is the major source of the problems, rather than the chemical loaded agricultural runoff and sewage that we create is misleading and puts the blame on those individuals who rely on medical technologies for their wellbeing.

There is, nonetheless, still a kernel of imagination here worth unpacking. After all, Holister is ultimately interested in the "consensuality" that has not been given by these fish to be exposed to massive quantities of endocrine disruptors in the first place. Though situated in anxious time, Holister twists *evolutionary time* in order to better examine what constitutes the life for a fish in the first place and, like Tyrone Hayes bluntly asks, what might it feel like to be intersex? Intersex [human] activists have for years asserted that intersex surgeries on newborns constitutes a violation of consent because the procedures are performed before a child has awareness of their body and identity (Intersex Society of North America 2008). Imagining different temporalities allows Holister to examine questions of fishy wellbeing.

Another site of potentiality is Save The Frogs, a multinational campaign that seeks to raise awareness about the globally dwindling frog populations threatened by toxic chemicals and to bring their futures back to the forefront. Incorporating Tyrone Hayes as a spokesperson, the program not only notes the importance of frogs in testing human medication but about the appreciation that many of us have for frogs as companion species, particularly as children. "I want a world where my children can grow up mesmerized by these amazing creatures as I did as a kid," says Dan Bissett, a supporter of Save The Frogs (2015). The protection of wildlife, it seems, becomes particularly worth saving *again* for our current and future children. Here this more subtle reproductive futurism justifies the project's advocacy for humane testing alternatives to frog dissection in school classrooms. The project intertwines our futures with those of frogs,

demonstrating that our own lives as humans depend on the wellbeing of our fellow creatures. Although the program is not without its limitations (for instance, the seeming homogeneity of transnational campaigns as well as the strange focus on frogs rather than other species also affected), this is another step into the right direction of thinking more critically about a *creaturely poetics* of transspecies temporality.

In reflecting upon the limitations of "The Toxic Baby," Emma Holister's comic, and Save Our Frogs, it becomes clear that we must strive to look outside of *straight time* and *reproductive futurism.* The aforementioned examples are instances where we can see glimmers of possibility in what might otherwise be seen as normative temporalities, but they remain somewhat unsatisfying nonetheless. In the specific case of these endocrine disruptor panics, how might we radically re-imagine failing the stable sex norms? After all, Muñoz associates "queer failure with a certain mode of virtuosity that helps the spectator exit from the stale and static lifeworld dominated by the alienation, exploitation, and drudgery associated with capitalism or landlordism" (2009 p. 173). In this way, he positions failing *straight time* and *chrononormativity* as a mode of resistance. Although we must continue to critically examine the toxic and destructive effects we are having on our ecosystems, it is necessary to critique the normative longings that these may evoke and instead imagine how failure might be fruitful and create new queer futures.

Conclusion

In this thesis, I have conducted close readings of popular media about endocrine disruptor panics through the lens of temporality to argue that our articulations of time help construct difference on the grounds of sex, sexuality, gender, race and species. I have offered the lens of anxious time and traced several other intertwined temporalities -- including *reproductive*

futurism, chrononormativity and *evolutionary time* -- in a diverse archive of texts including foundational environmentalist books (such as *Silent Spring* and *Our Stolen Future*); news articles about how sex, gender, race, and nation are articulated through temporality in these panics; a documentary entitled *The Disappearing Male*; a comic by Emma Hollister about endocrine disruptor panics; and the website for an environmental protection campaign entitled Save Our Frogs. After unpacking the problematic way that temporalities have been articulated in endocrine disruptor panics, I argued that temporality can be used for subversive means, specifically through articulating a politics of *imagination* that recognizes our shared *creatureliness* with non-humans, as *coeval* vulnerable creatures.

As issues of climate change grow more and more urgent, it behooves us to continue examining how our normative anxieties about sex, sexuality, reproduction, race and animality affect our capacities to think more critically about environmental justice and longevity. Ultimately we must recognize that ecological justice relies upon the wellbeing of all creatures, not just normative ones, of whom there are arguably none anyway.

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Appendix

Figure 1: Slide Presentation of Intersex Gonads of a Frog from Hayes and Chaffer 2012.

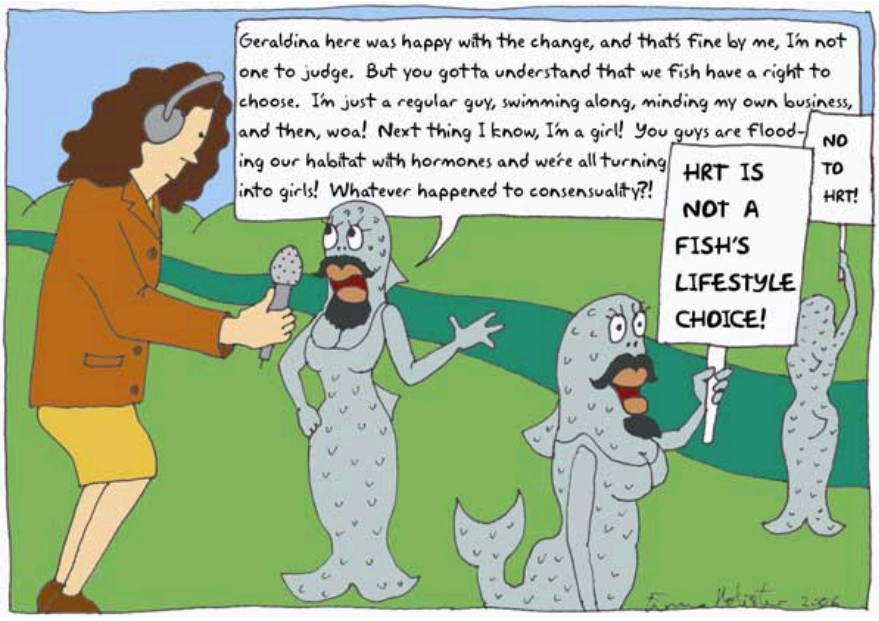

Figure 2: Untitled comic by Emma Holister 2004 about toxic exposure.