

"As It Flows Down from the North":
Confluences of water stewardship emerging from the
Ottawa River watershed

by

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Abstract

Flowing through the political centre of Canada, the Ottawa River is an invaluable source of potable water, industrial sustenance, recreational mediation and aesthetic prestige. Inseparable from un-ceded Algonquin lands, the river divides two provinces and is governed by multiple political bureaucracies which take different approaches to water stewardship. The river may be healthier than it once was, but emerging Anthropocene threats like microplastics, low water levels during record breaking summer heat and neocolonial developments are enhancing regional water insecurity. Based on fieldwork conducted during the summer of 2016, this research describes how localized confluences of people, institutions, technology and non-human species are responding to assembling ecological pressures by configuring new approaches to Ottawa River watershed stewardship. I explore how such confluences constitute the citizen-science labour of the Ottawa Riverkeeper Riverwatcher monitoring program and the political activism of First Nations and allied resistance to the Energy East oil pipeline.

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Figure 1: Watershed workshop at Cultural Camp, Kitigan Zibi First Nation, July 26, 2016

1 Chapter: Confluences of water stewardship emerging from the Ottawa River Watershed

Tuesday July 26, 2016: Kitigan Zibi First Nation

At the beach, a small world was laid at our feet. A few minutes before a group of youth, teachers and elders began to gather around it, I had brought down this plastic, miniature land in a custom carrying case from the small blue hatchback that I had driven to the Kitigan Zibi First Nation reserve in from Ottawa. It was a three dimensional 25” x 30” x 7” watershed/nonpoint source model of a suburban landscape manufactured by Enviroscope, a company based in Herndon, Virginia that specializes in producing “hands-on products for environmental education” (Enviroscope 2017). Designed for teaching people of all ages about watershed hydrology, pollution and methods of promoting watershed integrity, the model is a key tool used by wetlands biologist Meaghan Murphy when teaching the public about water stewardship. I travelled to Kitigan Zibi with Murphy, staff scientist and Riverwatcher program coordinator for the Ottawa Riverkeeper (ORK) and Kat Kavanagh, executive director of the new Water Rangers citizen science open data initiative to the Kitigan Zibi First Nation, joining them in their outreach education work. They hoped to build relationships with the Kitigan Zibi community by delivering a workshop on water stewardship and citizen science water testing to children and Elder instructors at the summer Cultural Camp program held outdoors on the shores of Lake Wanaki.

After a morning lesson about the significance of Ahmik - the Algonquin language word for beaver - by four middle aged women elders leading the camp, everyone congregates on the grass lawn off the sandy shore of the beach around the Enviroscape model to listen as Murphy begins her workshop, her curly hair bobbing in the wind as she speaks. The elders and eight students - four boys and four girls aged 10-14 in grades 5-9 - are joined by Celine Whiteduck and Jan Cote, teachers at the nearby Kitigan Zibi Kikinamadinan school who had coordinated the Murphy and Kavanagh's visit at Cultural Camp. The camp is a summer learning opportunity held outdoors annually for youth to learn the Anishinaabe traditional lifestyle, language and survival techniques as well as their roles and responsibilities for protecting Mother Earth (Kitigan Zibi First Nation 2016). Except for a large plywood sign located uphill from the beach at the tree line listing the Algonquin language names of fish native to the area and a handmade poster naming the parts of a beaver's anatomy, the stories of the elders and the land and water of the lakeside environment are the "texts" for learning at the camp. Kavanagh and I help Murphy to mix small containers of lake water with off-brand Kool Aid mix for her demonstration: cherry red for chemicals like pesticides and grape purple for fertilizer. At Murphy's request, some of the kids assembled around the watershed model spread No-Name brand hot-chocolate powder from a yellow can around the tiny farms in the model to represent soil. Under an overcast sky with a cool breeze blowing across the lake before us, Murphy begins to describe the hydrological cycle, ranging from the identification of summer humidity to the precipitation of rain and infiltration through soil to groundwater or diversion to streams, creeks and lakes, as well as evapotranspiration, the release of water by plants into the atmosphere.

Murphy then briskly moves into describing the watershed concept. “If a single drop of water falls within that watershed it will eventually make its way into a river. So, we are part of the Ottawa River Watershed, that’s what I work on, and you are part of...the Gatineau River watershed. Any drop of water that would fall on this land would eventually seep into the ground and go into the groundwater and into that river or go over land into that river. So, a watershed is the total area that any raindrop that is going to fall on that area will eventually make it to... that particular river. So, if we were to make it rain on this area,” Murphy continues, adjusting her glasses as she points at a large hill in the plastic landscape of the model. “Are we doing that?” asks Kavanagh excitedly, supporting Murphy’s lesson, her blonde hair tied back in a ponytail, standing ready with a spray bottle full of lake water, prepared to simulate rain. “Not quite yet,” Murphy replies decidedly, eliciting a round of laughs from her audience. “Let it rain!” exclaims Whiteduck.

“Eventually,” Murphy continues, “Those drops of water are all going to make their way into the watershed that’s part of this river right here. And why is it important to know where all the water goes to?” Murphy asks the youth seated around her. “So we have water to drink,” offers a young boy sitting quietly by the model watershed. Murphy affirms his answer, explaining the processes by which potable water collects in aquifers, and then asks, “why else is it important to know where your watershed is?” After a short silence, punctuated by the click of my camera shutter as I make pictures of youth interacting with the toy trucks, and figures of people and small plastic dinosaur figures

that populate the model, another young boy suggests “Power?” Murphy affirms his answer as well, noting that dams for hydroelectricity throughout the river affect levels of water flow in creeks and often influence dry creek beds, a symptom of the impact of social reliance on hydroelectric energy. “What about pollution, what about things that might hurt the quality of water? It’s really important to know what your watershed is. If I put a mine here,” Murphy says, indicating a hillside for her hypothetical resource extraction, “and I, for instance, spill a bunch of chemicals here” she continues, pouring some of the symbolic red chemical mix down a hillside, “where are those chemicals going to go?” “Into the lake?” responds a student. Murphy continues,

They’re eventually going to follow the path of that water into that lake or river you really care about. So, at Ottawa Riverkeeper, we’re concerned with everything that’s happening in the Ottawa River watershed, which you guys live in. And you have to know your watershed and what’s happening, because something that happens really far away from you could impact a river or a creek that runs into your river or creeks. So, it becomes everybody’s problem. And basically, these watersheds connect us all. Everything that you do here, impacts the people below you and the people up river of you, would impact the quality of your water. So, we have to know and think about what a watershed is because we’re all connected by that water.

As the sky opens slightly, the group is then lead through further scenarios in which pesticides and fertilizer run-off are released into the suburban ecology of the model, and decisions need to be made about how to manage the effluents. “Ok, I need two people to be rain clouds!” Murphy requests. Two youth take hold of two spray

bottles and begin spraying, simulating a rain storm that floods the surface of the model and washes over a construction site and a farm, spreading chemicals and E. coli bacteria to a lake on an adjacent corner of the model.

Look at that. So, this is an example...the guy that lives here, that is doing some construction work over here, may not think that he's having any impact on this lake right here, because he's so far away. But because it's a watershed and water is always moving down slope, what he's doing can actually impact how healthy the lake is. That's one of the things that we always have to remember. Whatever we choose to do on land can actually impact our water system and how we're able to use it. Now we've got all this poop in here, we've got lots of bacteria, now we can't swim in that lake anymore because it's going to make us sick. Small kids can't swim in it anymore, now there's a swim advisory.

“The fish are dying!” one child calls out as he pushes a plastic pterodactyl down the road on the back of a toy garbage truck, playing with other students around the model boisterously as Murphy reaches her point: that humanity can choose to change how water is used and stewarded.

We can't eat as many of our fish because there's all these chemicals that are now being stored in the tissue of the fish. So, we can't eat the fish we used to eat. So now we can't swim in it, now we can't fish out of our lake. There's so many chemicals here, there's way too many fertilizers that now we can't drink out of the water. And you guys know what's it's like to not have municipal drinking water that you can drink from. These are all key things and we have to remember, there's some things we can do. Now, we can reset this and let's think about some

different ways we can fix this, ok? What do you think we could do differently to protect this water body the next time a rain happens?

1.1 Emerging water stewardship in the Ottawa River watershed

This morning on the beach at Lake Wanaki was a unique convergence of two powerful groups intimately involved in protecting the Ottawa River watershed, within which Kitigan Zibi and the smaller Gatineau River watershed are located (Email to author 2017). The ORK, the largest grassroots, non-profit organization with charitable status involved in monitoring and advocating for the integrity of the river, and Kitigan Zibi, an Algonquin First Nation with an intimate pre-colonial relationship with the Ottawa River, which they call the Kitchissippi (Wallace 2005). Kitigan Zibi is also the Algonquin First Nation geographically closest to the city of Ottawa concerned with the protection of their sacred waters and lands from commercial and industrial development. In contrast to the rest of the region, a majority of Kitigan Zibi residents have no access to potable fresh water due to naturally occurring uranium contamination in their territorial water sources (Jefferys 2017), a perpetual chronic crisis of water security (Government of Canada 2017a) cannot be ignored. As I have described above, both entities met this morning at a Kitigan Zibi lakefront to educate children about watershed stewardship. The integration of First Nations traditional ecological knowledge (TEK) and settler-colonials' positivist science methods is a major object of contemporary ecological and environmental anthropological research, as Paul Nadasdy addresses critically in his book **Hunters and Bureaucrats** (2003), and this is a characterization of events that could be discerned from my description at a distance.

However, as a participant in activities that morning, I found that there was much more that occurred than a simple unilateral integration of knowledge for the purpose of enhancing an initiative that could primarily inform bureaucratic management of the Gatineau and Ottawa River watersheds or further imbalance regional power relations around water resources. Instead, Murphy, Kavanagh and I were invited to Kitigan Zibi by Cote, a physical education teacher, and Whiteduck - a science teacher at the local school - to offer an awareness of hydrology, watershed education and citizen science water monitoring to Cultural Camp youth. In this process, youth were not purely being taught scientific norms or methods employed to enhance bureaucratic, settler colonial control of Indigenous lands. Instead, they were being strategically introduced to ideas and tools that enabled possible relations with water within the context of their own situated ways of life (Nadasdy 2003: 121). In addition to learning about beaver that morning from elders, Whiteduck allowed youth to access a variety of resources like the knowledge of hydrological modelling via Murphy and exposure to Kavanagh's digital mapping application - as well as citizen science water sampling techniques illustrated by them both - that could encourage the creation of a new capacity for water awareness and stewardship on Kitigan Zibi lands. In this instance, Kitigan Zibi First Nation is incorporating these practices into a larger repertoire of water stewardship potential that transcends the largely exclusive, unilateral bureaucratic hegemony exemplified in Nadasdy's case study of the Kluane.

In her work with the Indigenous peoples of Northern British Columbia and Yukon territories and their relationships to the glaciers they co-exist with, anthropologist Julie Cruickshank (2006) has recognized that while divergent from the knowledge that many Indigenous people create from their interaction with their lands, scientific knowledge is used by Indigenous peoples in significant ways to create new understandings of their own cultural histories and enhance regional Indigenous solidarities. She describes how the ancient remains of a young hunter that emerged from a glacier in 1999 in the territory of the Champagne-Aishihik First Nation led to their members' cooperation with scientists who used radiocarbon dating and DNA testing to discern that the body was over 550 years old (2006: 364). The discovery, subsequent analysis of the hunter's relations to Native American ancestry and planning for funerary arrangements enhanced the Champagne-Aishihik First Nation's oral histories as well as their relations with the neighbouring Tlingit First Nation (Cruikshank 2006: 365). In this entanglement of knowledges, the understandings of science were utilized by the Champagne-Aishihik in ways that contributed to their ongoing existence in the glacial landscape (Cruikshank 2006: 365). This dimension of Cruikshank's ethnography is comparable to the interactions designed by Kitigan Zibi teacher and elders to enhance Indigenous livelihoods on Wanaki Beach I have described. Nadasdy and Cruikshank's work is useful in considering the emerging relations of water stewardship between Indigenous and settler colonial citizen scientists in this context, however, throughout this writing I will draw on ecological and anthropological literature helpful for considering how collective water stewardship capacity as demonstrated at the meeting on the beach that morning also characterizes larger stewardship initiatives in the Ottawa River watershed.

It is important to recognize that Whiteduck's invitation overtly exposed Murphy, Kavanagh and I to landscapes we had not previously travelled through and knowledge of emerging ecological phenomena gleaned from Cote and Whiteduck's experience within the broader northern Ontario landscape that we were previously unaware of, which enhanced the conceptual scope of our stewardship practices. We were even graciously invited to a seasonal beaver lunch before departing. This reciprocity of knowledge, practices and food took place within an emergent sociocultural context that necessarily blurred the "discreet bounded systems" of experience and knowledge (Nadasdy 2003: 133-134) structured by many projects seeking to integrate TEK into scientific studies. The meeting site of Cultural Camp, the experimentation of the youth and what was learned by Murphy, Kavanagh and I in many ways subverts a clear Bourdieusian interpretation of this morning as a process of learning knowledge and practices that are simply enabling either party to play by "the rules of the game" (Nadasdy 2003: 5). Within the unique regional cultural ecology (Geertz 1972) of what is known as the National Capital Region (NCR) of Canada, the two entities were imagining a future culture of water stewardship (Hastrup 2014: 21) at a time when the myth of Canada as a nation with secure, ever-lasting fresh water resources (Barlow 2016: XV) is gradually being eroded by a convergence of longstanding and emerging threats to watershed integrity.

Throughout my fieldwork, people often told me the Ottawa River is far healthier than it was during the final stages of the colonial logging industry or even in the mid to late 20th century when industrial effluent and municipal sewage was still being sent into

the river untreated. The City of Ottawa's Ottawa River Action Plan (City of Ottawa 2017), its continued municipal sewage infrastructure diversion strategies (CBC 2016a) and the advocacy efforts of the ORK to enhance and organize inter-jurisdictional responsibility between governments through efforts such as the Gatineau Declaration (Ottawa Riverkeeper 2017a) are examples of attempts to create a new level of ecological responsibility for the river and watershed. However, low levels throughout the Ottawa River during record 2016 spring and summer temperatures (Johnstone 2016), emerging research on microplastics pollution (Vermaire et.al., 2017) and the impending threat of TransCanada's Energy East oil pipeline eventually crossing the river if it is constructed (Council of Canadians 2016a) were phenomena that reminded most I met that the integrity of the watershed is vulnerable to dynamic forces within and beyond the Ottawa region. Indeed, climate change was also often identified as the pre-eminent prospective threat to the integrity of the watershed in many conversations I joined. In response to these entangled, emerging risks, creating common ground and producing new collective capacity prepared to address even more severe water insecurity than we are currently experiencing is seen by water experts as the most important issue facing Canada as a nation (Barlow 2016: XV).

Some scholars of climate change and the Anthropocene - the current era of geological change defined by human impact on the environment - refer to the regional collective response to a growing assemblage of ecological risk I have begun to describe in the meeting at Kitigan Zibi as "Earth Stewardship", which describes "shaping trajectories of social-ecological change at local-to-global scales to enhance ecosystem

resilience and human well-being.” (Ecological Society of America 2017). More than just another session of summer education outreach run by Murphy in the communities of the NCR, the convergence of stewardship capacities taking place on the beach at Wanaki Lake on Kitigan Zibi territory this July morning was coordinated to influence the possible collective stewardship capacity of the unified Gatineau and Ottawa River watersheds. Sharing skills, knowledge and experiences on land and water together has a potential to create new mutual comprehensions of our environment. This sharing also helps us develop strategies of how we attend to it that will influence everyone present, the larger collectives they belong to and the endurance of the watershed in the future. In her multi-sited work examining climate change and fluctuating human relations with water in the Anthropocene, Danish anthropologist Kirsten Hastrup refers to this kind of collective attention of society to influence the water they “co-exist with” as the configuration of human relations with water, attempts to “fashion their life according to their understanding of water’s course and force” (2014: 03).

On the ORK website, the page dedicated to describing the Riverwatcher program contains a link to a PDF copy of the Riverwatch Handbook, a field guide developed to help Riverwatchers identify concerns, collect information and report their observations (Ottawa Riverkeeper 2015). The second to last page of the handbook includes the famous, omnipresent quote by anthropologist Margaret Mead, used by activists of all stripes across the Western world to advance the possibility of their work: “Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it is the only thing that ever has” (Margaret Mead in Ottawa Riverkeeper 2015). The number

of people who count themselves as Riverwatchers or even those who consider themselves engaged in the practices of water stewardship in the Ottawa River watershed may indeed be small compared to the population of the region. However, in the pages that follow I will illustrate that the Riverwatchers collective and instances of convergence with others like this morning at Kitigan Zibi are only two examples of creative collective human stewardship initiatives with water among many that form the broader stewardship of the Ottawa River watershed. Within the larger watershed, there is a dynamic, ever-shifting network of confluences of water with human stewardship capacities that has formed and continues to form to address the many tiers of threats to the watershed emerging at this point in history and will be instrumental in addressing those of the future.

1.2 Project genesis

This research emerged from some unlikely places. From 2012 to 2015 I lived in London, Ontario, a city in Southwestern Ontario recognized in media and political narratives as Canada's manufacturing heartland, which has been impacted severely by the collapse of the regional manufacturing industry. London is noted as having among the highest per-capita unemployment rates in the country and some of the highest per-capita clean syringe distribution for intravenous drug use. While living there I was employed as a member of a team of street outreach workers responsible for developing relationships with homeless and at-risk people and helping them access support services and housing. Every shift, when we were not attending to crises or supporting people at appointments, a shift-partner and I would walk for hours through London's urban landscape, often along

the Thames River, named to reflect its British colonial lineage. We would constantly meet marginalized people living on the banks of the river with diminished access to food, shelter and potable water: the most basic components of bare life. Industry effluent and its low seasonal levels having long ago rendered the river water undrinkable.

On my days off, I spent time outside of the city, and I began photographing volunteers with the Thames-Talbot Land Trust, one of many groups across the country that rehabilitate donated tracts of developed land. Seeing these volunteers tend to, and care for, the land with which they felt an affinity also inspired my interest in the work being done by regional anti-oil pipeline activists to subvert Enbridge's revived Line 9 oil pipeline running from Sarnia, Ontario to refineries in Montreal Canada (Enbridge 2017). In early August of 2014, I visited a valve change site on a rural side road near Woodstock, ON where a group of activists cooked meals, slept, played volleyball and organized as they occupied the land over the pipeline for nearly a week until they were arrested (Herhalt 2014). In one communique published by The Council of Canadians, they expressed explicitly that they were halting work on the pipeline to protect the integrity of the Thames (Council of Canadians 2014), known to Odawa and Ojibway First Nations people as Askunessippi or "the antlered river" (Council of Canadians 2016b).

After my visit, I went back to work in London. I found that I began observing the taps in the kitchens at shelters or at the homes of those who recently found housing, thinking about how much more at-risk people I knew throughout that community would be if public access to potable water was compromised by a pipeline spill. In such a

cataclysmic event, all of our lives, no matter how healthy or well-resourced they might be, would be rendered immediately vulnerable without access to potable water. As the ongoing municipal water crisis in Flint, Michigan, the 2010 oil spill in the Kalamazoo River near Marshall, Michigan (State of Michigan 2017) and the July 2016 Husky oil spill compromising public water access in North Battleford, Saskatchewan (Quesnel 2016) in the summer of 2016 have all exposed, we are all extremely vulnerable if public water sources become compromised. Upon beginning research at Carleton for my M.A., I saw an opportunity to further my understanding of who is protecting water in Canada's NCR and how they are going about it. Particularly, I wanted to learn about citizens in Canada's NCR who are personally attending to the Ottawa River, the invaluable source of not only potable water for residents of the capital, but also aesthetic prestige, industrial support and recreational mediation. Upon learning about the ORK Riverwatchers, I developed the central question that motivated my research: How does a disparate group of volunteers situated throughout the National Capital Region accomplish effective collective water stewardship work in the expansive Ottawa River watershed?

1.3 Definitions of Stewardship

To this point I have discussed what was happening at Wanaki Lake during our visit as a meeting between unique cultures concerned with water stewardship. The Cultural Camp youth were convened on the beach at Lake Wanaki to immerse themselves more fully in the environment and learn about their larger roles and responsibilities for protecting the water that flows through Mother Earth (Kitigan Zibi

First Nation 2016) as the next generation of their nation. The work of Murphy and the ORK Riverwatcher program is directed by their central goal: “Swimmable, drinkable, fishable waters now, and in the future. To achieve this, we carry out a range of activities, from water quality testing, to court challenges, to education and outreach (Ottawa Riverkeeper 2017b).

In both contexts, there is a concern with more than just the sustainability of resources for the present. The Riverwatchers and Cultural Camp place an emphasis instead on protecting water to ensure the future survival of water and the life that depends on it. Throughout this thesis, I will view the work of the Riverwatchers and their contemporaries attending to the Ottawa River through the lens of water **stewardship**, rather than simply management or conservation. Below, I will address why water stewardship is the term I have chosen to describe the work that the ORK Riverwatchers and the larger Kitigan Zibi First Nation are doing on their lands and the Ottawa River and I will identify the definitions of stewardship that most accurately describe what I have observed in the field.

Richard Worrell and Michael Appleby (2000) contend that while widely used in natural resource management literature in the early years of the 21st century, stewardship was not a well-defined term, despite its increasing relevance to private and public responsibility of forests, marine environments and other features of regional ecology (2000: 263). They retrace the sacred origin of the term to the term “sty-ward” the old-testament fostering of land and livestock in the name of god (2000: 264). However, as

modernity manifested, the concept of human responsibility to steward land on behalf of a deity was ultimately seen as an antiquated idea; perhaps only a sacred duty rather than a truly altruistic act for humanity and the world in which we live (2000: 271). In the secular era of land use management by land owners or bureaucratic agency managers, they recognize that stewardship must deliver public benefit (with oversight) and a consideration of other species (2000: 273). They also note that stewardship should not just be the purview of those who own or are tasked with managing land but, citizens and the public themselves, especially consumers or recreationalists (2000: 273). They propose a further definition:

Stewardship is the responsible use (including conservation) of natural resources in a way that takes full and balanced account of the interests of society, future generations, and other species, as well as of private needs, and accepts significant answerability to society (2000: 275).

This definition describes the general structure and scope of responsibility involved in the stewardship of the Ottawa River that I observed in the work of the ORK Riverwatchers and others. However, it is considerably removed from the reality of contemporary environmental threats and Anthropocene risks emerging within the Ottawa River watershed described above. It therefore does not account for the complex ways in which humanity is engaging in both the use and conservation of the water and the wide spectrum of practices necessary to enhance its existence. Considering the practice of stewardship today, as Roy H May Jr. writes, “raises the question of anthropology” and encourages an expansive, inclusive mode of anthropological inquiry capable of recognizing the capacity for human care for the environment across society (2015: 84).

May's perspective is part of a larger effort ecology to advance the term "Earth Stewardship", an expansive, yet apt concept which in its most simple definition involves, "shaping trajectories of social-ecological change at local-to-global scales to enhance ecosystem resilience and human well-being" (Ecological Society of America 2017).

Proponents of Earth Stewardship acknowledge human transformation of the Earth in the Anthropocene as foundational, as well as the power of "assemblage theory" coined by Donna Haraway, Bruno Latour and others, to explain "life as a process that unfolds through changing assemblages of humans, other species, technologies and institutions" (Ogden, et.al. 2013: 341). The term, "Earth Stewardship," is useful here because it situates the concept of stewardship within contemporary socio-ecological change and considers how, "the local articulates with and is transformed by economic globalization and global climate change" (Ogden, et.al. 2013: 341). The concept of Earth Stewardship then, supersedes Worrell and Appleby's articulation of stewardship in significant ways. This is a crucial re-focus in considering the work of grassroots water stewardship within the NCR.

If contemporary (human and non-human) life in local places is characterized by both local and trans-local processes of economic, social and environmental change, local stewardship of life-sustaining resources such as water must be designed to address those particular complexities. Within the 150 kilometers long Ottawa River watershed, where environmental policy decisions with extensive impacts are made, to not consider watershed stewardship as a far-reaching process that requires a dynamic assemblage of

relations between actors to affect change would ignore what was happening in instances like the morning at Cultural Camp I have described. The work of the ORK and the Riverwatcher program then, in their intent to ensure the sustainability of current intersecting uses of the Ottawa River watershed in the future by employing practices ranging from water quality testing to education as well as legal strategies (Ottawa Riverkeeper 2017b), constitutes water stewardship to be sure. However, as the morning at Kitigan Zibi's Cultural Camp described above illustrates, the broader work of the ORK and the Riverwatcher program also constitutes a kind of Earth Stewardship as it responds to localized assemblages of socio-ecological change and crisis initiated by wide ranging causes by engaging new collective capacities and technologies.

For Kitigan Zibi, ORK Riverwatchers and Kavanagh's Water Rangers initiative, contemporary water stewardship is enabled by engaging these new collective capacities and technologies through practice of "citizen science", research collaborations coordinated between volunteers and scientists often designed to expand opportunities for scientific data collection and ensure access to scientific information for communities (Cornell Lab of Ornithology 2017). A further working definition is offered by the Cornell Lab of Ornithology, which considers citizen science as "projects in which volunteers partner with scientists to answer real-world questions" (Cornell Lab of Ornithology 2017). Collaborations between citizens and scientists to monitor migratory patterns in the United states have been happening since at least the late 19th century, however, they have become more prominent over the last twenty years as the internet and mobile communications technology have enabled greater citizen participation, mapping and

more accurate, immediately communicated observations (National Geographic 2017). Citizen science has become an object of study for some anthropologists concerned with the production of scientific knowledge (American Anthropological Association 2014) and by scholars involved in the social study of science (Ottinger 2010). In her research on citizen-supported air quality studies in the United States, Gwen Ottinger found that the standards that such studies are designed to adhere by determine the legitimacy and the effectiveness of citizen science research (2010: 266). The standards that guide citizen science studies can legitimize the practices, data and findings of citizen-developed research, but also open such research to immense scrutiny by scientists and powerful interests that wish to refute claims regarding pollution or absolve themselves from responsibility (Ottinger 2010: 266). Thus, Ottinger recognized that standards are a site of intervention for efforts to democratize science and science- informed policy (2010: 244). As Murphy noted in an interview posted to the ORK blog after she was hired as Riverwatcher coordinator in 2013, the use of citizen science makes it “possible to get the government’s attention, whether local, provincial or federal. Unless we tell the government that these issues are important to us and that they - governments - are accountable to us, things won’t change” (Ottawa Riverkeeper 2013b).

Most of my research was done on the unceded traditional lands and waters of Algonquin First Nations in Ontario and Quebec. Mi’kmaw scholar Bonita Lawrence has written that Algonquin First Nations decisions over the stewardship of their lands and waters in the NCR, including the Kitchissippi - the Ottawa River - were transformed by the violent dispossession of settler-colonial governments and the genocide visited upon

First Nations in Canada (2012: 259). The status of Kitigan Zibi as one of 90 First Nations across Canada with boil water advisories currently in effect (Government of Canada 2017a) that Justin Trudeau campaigned on rectifying (CBC 2015a), is a lasting, chronic violence from this colonial history. Today, the future of monitoring-based water stewardship of Kitigan Zibi reserve land by Kitigan Zibi First Nation youth may be bolstered by their engagements with Murphy and Kavanagh, but the ongoing work of making broader, meaningful stewardship decisions about the integrity of all traditional Kitigan Zibi lands and waters is situated in the political realm. Algonquin decisions regarding unceded, non-reserve lands around Parliament and beyond, have been structured by alienation from jurisdiction over those lands and their response to the hegemonic, bureaucratic management of development issues. Kitigan Zibi's stewardship of its lands and waters are therefore often bound up in political and legal arenas, mediated by chiefs and band council as well as lawyers who they employ to negotiate with federal and provincial governments (Lawrence 2012: 275).

Just before the 2016 Christmas holidays began, the Kitigan Zibi First Nation filed a groundbreaking land claim over the lands that encompass Parliament Hill, the entire section of Victoria, Chaudière and Albert Islands - known collectively as Asinabka to the Algonquin (asinabka.com 2017) - and LeBreton Flats, where a hockey arena and billion-dollar condo-developments are slated to be built, among other municipal facilities (Barrera 2016). Towards the end of my fieldwork, I also took part in a demonstration at Parliament Hill against the proposed crossing of the TransCanada Energy East oil pipeline under the Ottawa River. Kitigan Zibi Chief, Jean-Guy Whiteduck, was present

and addressed the threat of Energy East to the Ottawa River. “We as Aboriginal people have not been consulted by the government of Canada. We are concerned about the water. The water is sacred to us and we must take every effort to protect the water,” Whiteduck told the crowd. An environmental impact assessment published by Ecology Ottawa and The Council of Canadians in September of 2016 advised the public that a spill from the Energy East pipeline into the tributary Mississippi and Rideau Rivers could compromise Ottawa River drinking water intakes in Gatineau and Ottawa within just over 60 hours of a spill, among many other irreversible impacts (Savaria Expert-Conseils Inc. 2016). The contemporary water stewardship practices of Kitigan Zibi , then, also constitute yet another articulation of Earth Stewardship characterized by an assemblage of community based practices like Cultural Camp, the adoption of hydrology and “citizen science” water monitoring practices, as well as political and activist negotiation to regain jurisdiction and power over lands and water that will enable them to have greater power over the risk of developments such as pipelines, which I will address further in chapter three.

1.4 Literature Review

Water stewardship is not often specified as an explicit term or object of study in anthropological studies of human relations with water. However, building on the definition of Earth Stewardship outlined above, I have chosen to review classic and contemporary ethnographies concerned with social change, collectivity and the mutuality between water and the life it supports. The irrigation studies of Clifford Geertz (1971),

Stephen Lansing (1987) and Paul Trawick (2001) demonstrate that through large scale water management, water and human beings in local landscapes constitute one another physically and socially. Geertz-who studied the difference between Balinese and Moroccan irrigation systems-recognized that “if a people live in a place long enough the quality of it enters into the substance of their life” (1971: 38). However, in Lansing’s further study of the role of sacred Balinese water temples over Subak cooperatives in coordinating irrigation of rice farms, he recognized a complexity that Geertz did not in his study. Lansing found that when the temples and their role in irrigation (and therefore the constitution of regional Balinese society) were overlooked in new state-directed plans to increase rice production, ecological havoc ensued. Pesticides employed to subdue bacterial and insect infestations of the rice farms, also killed eels, fish and harmed the farmers themselves, disturbing the delicate balance established by the temples and their masters (1987: 339). The perpetual and dialogic co-constitution of human-water-body relations cannot be overlooked. As Trawick observed in the meticulous moral economy of proportional irrigation arranged by the Huaynacotas people to ensure equal access to scant water resources in the Peruvian Andes, careful stewardship of water is, “a product of the unfolding of nature and culture together, of their mutual transformation” (2001: 374).

Brett Williams’ study of competing values transforming the Anacostia River in Washington, D.C. (2001), Shaylih Muehlmann’s research on the enumeration of endangered actors in Mexico’s Colorado River Delta (2012), Krista Harper’s examination of activist struggles to protect the Danube and Tisza Rivers in Hungary (2005) and

Veronica Strang's research on the role of Maori spiritual beliefs in New Zealand water stewardship (2010: 2014) all illuminate the diverse forms of stewardship employed to protect rivers in distinct cultural contexts. Harper's study is instructive in describing how political activism functions to steward rivers endangered by pollution and development projects within shifting post-soviet political economies, while Muehlmann's work elucidates the limitations of enumerating scarcity and environmental change and the subsequent "rhizomatic" human resistance to enumeration as resistance to not only hierarchy, but also commodification. Finally, Strang's work illustrates how treaty rights, Maori spiritual beliefs regarding water (2010: 5) and the ways water constitutes Maori life, are fundamental to how Maori people maintain stewardship over major water resources for all in New Zealand, including settler colonial New Zealand citizens (2014: 128).

Williams' study of the Anacostia River, however, is the closest ethnographic parallel to my research. Beginning with British colonial conquest, Williams traces the human structuring and production of the Anacostia River by conflicting use and exchange values (2001: 427). Examining the founding of the United States of America's capital, the establishment of centralized government and more recent urban renewal, he finds that the river has been shaped by the exchange values of military infrastructure, freeways, industrial waste disposal and the like, in opposition to the use values of citizens (including George Washington himself) (2001: 14). Citizens identified the river as a medium for recreation, community, aesthetic beauty and spiritual fortitude (2001: 427). This dichotomy of water values transformed the Anacostia River into a barrier to social

relations, rather than a socio-ecological lifeline, according to Williams. He describes a historical trajectory of colonial dispossession, state formation, environmental abuse and aspirations for restoration that is remarkably similar in many ways to those of the Ottawa River and Ottawa as a capital city. Williams concludes by proposing an innovative political ecology that over time explores “the connections and contradictions between natural and social processes” and can illuminate the problems of urban poverty and segregation (2001: 427).

These works illustrate that the responsive and dynamic stewardship of water in localized contexts is determined by the unique, place-based cultural ecology of local life. This concept finds common ground in the term “waterworld” (Hastrup 2009) coined by Danish anthropologist Kirsten Hastrup over the course of the last decade during her extensive ethnographic work on the sociocultural dimensions of global climate change. Hastrup and anthropologists Ben Orlove and Steven Caton consider Marcel Mauss’ notion of the “total social fact” to make clear that “water is all encompassing and takes multiple social forms” (2010: 402). Human beings and societies situate themselves necessarily close to water to subsist and use water to constitute their lives by irrigating, channeling and damming the force of water, among other methods. They do so in ways that are commensurate with their social and moral perspectives (Hastrup 2014b: 21). In Hastrup’s work, water is identified as a “central configurative force” (2014b: 20) of the world. It is an object of study that oscillates between nature and culture, a feature which enables its ability to dissolve the Cartesian dualism that characterizes much thought about life on Earth (2016: 7). A waterworld, therefore, is a dynamic lived reality, a conceptual perspective to consider social and natural process with and even a theory to understand

experience with or all at once perhaps, depending on the ethnographic moment one finds oneself in (Strathern in Hastrup 2016: 3). For Hastrup, the notion of a waterworld encompasses “the power of water to make and unmake social worlds” (2016: 03) and the simultaneous response of people as they “fashion their life according to their understanding of water’s course and force” (2014a: 03). For their purposes, Orlove and Caton determine a waterworld as “the totality of connections that water may have in a given society” (Orlove and Caton 2010: 403).

In line with the convictions of Earth Stewardship scholars, the environment of ecological precarity permeating the global and local requires new socialites and collective responsibilities to effectively ensure social and ecological resilience, according to Hastrup (2009: 13). Much of her work and her conception of what a waterworld is has been framed by her study of global climate change, however within my work here, while acknowledging her attention to the importance of the global, I will consider how such emerging socialites and collective responsibilities form within and attend to the local, or the regional more specifically. The varied ways in which human beings contain, channel and distribute water appropriate to their moral and social direction make it necessary to examine the relationship between people and water as an entanglement versus unidirectional causality (Hastrup 2014b: 21). The “entanglements” of socio-economic globalization and the rise of worldwide climate change that affects localities unevenly indicate that local environments are “increasingly perforated” and that simple sustainability no longer represents the complexity of how resource management needs to happen in places, according to Hastrup (2009: 24). In localities, where human societies

influence the hydrological cycle as they understand it in particular ways in order to ensure the survival of their communities (the practice of water stewardship, for example), Hastrup writes, we therefore must consider how water is in “confluence” with human imagination and interest (2014b: 21).

A confluence, in hydrological terms, is “a meeting point of two or more rivers...where a tributary joins a major river, called the mainstream” (Chaudhary 2014). Throughout this work I will show that if we expand our notion of the confluence concept beyond the meeting of two rivers or water courses to the cultural ecology that water co-exists with, we can understand how human imagination and interest in survival within the Anthropocene brings a fusion of the social, technological and non-human to converge with water. Such convergences or confluences increasingly enable kinds of stewardship necessary to enable the endurance of all life in the waterworld that is the Ottawa River watershed. Water, and such forms as confluences, can be conceived as theory machines (Helmreich 2011: 132-133) or the medium with which we can understand how meaning and therefore action is constructed in practices like stewardship. However, the concept of the confluence as Hastrup articulates it and as I employ it is not metaphorical purely, but instead references the deliberate ways in which people influence the hydrological cycle “as they perceive it, for their community to thrive” (Hastrup 2014: 23). Throughout my fieldwork, I have observed two typical manifestations of this in practices and sociocultural formations. I have witnessed repeatedly how organizations, people and technology physically immerse themselves or place themselves in confluence with water to create or influence the direction of watershed stewardship. As illustrated during the

morning at Kitigan Zibi I have described above, I have also witnessed the meeting of people with different cultural forms of knowledge living in different parts of the watershed when they converge together to strategically enhance or create new stewardship capacities. These kinds of confluences of water practices with sociocultural formations are not mutually exclusive, however, but are instead often co-constituent.

Hastrup's work considers human manipulation of water using canals, dams and water towers, but does not address in depth other forms of technology used to read and communicate with water I encountered during fieldwork. I will therefore also explore how Bruno Latour's concepts of collectivity (Latour 1999: 193) between humanity and the non-human - particularly his consideration of our relationships with the technology we use for water stewardship practices - account for the emerging forms of water stewardship such as the data collection and sharing accomplished by Kavanagh's Water Rangers web app. Finally, the relevance of anthropologist Tim Ingold's conceptions of the "meshwork" (2010: 3) that composes our existence within contemporary landscapes will be considered as a supplementary means to consider how the confluence and subsequent social configurations of water and collectivity are operative in the stewardship of the Ottawa River watershed. The notion of meshwork opens the possibility of considering the mutual trajectories of water and water stewardship enabled by the strategic assemblage of people, objects and other species engaged in practices to enhance the integrity of water for the future.



Figure 2 Algae bloom in the Rideau Canal reported to Water Rangers app, August 24, 2016

1.5 Methodology

1.5.1 Situation, fieldwork and Ottawa River watershed stewardship as an object of study

I chose the Ottawa River watershed as a research site after being situated in Ottawa for several months to live and study within the Sociology and Anthropology program at Carleton University. More than a choice of convenience, exploring the river enabled me to explore my own burgeoning relationship to the water I relied on in the place that I found myself living; the very water that I drank, washed in and used for so many other daily quotidian purposes. Located five minutes from my home in the west-end of Ottawa, the Britannia Bay Park and swimming beach quickly became a primary gateway for observing the public life of the river. More than its historical significance, I was intrigued by the massive size and omnipresence of the river throughout the city and the ways in which it shaped people's lives from season to season.

The Ottawa Riverkeeper (ORK), arguably the highest profile non-profit organization doing stewardship of the river in the NCR and beyond, became my primary group of affiliation throughout my research. Their profile, position and engagement in public matters related to the Ottawa River made them an ideal collective to collaborate with, but I was specifically interested in their Riverwatcher program which I first learned about through an interactive map on the ORK website. The map shows the location of a majority of volunteer ORK water watchers (or, those who consent to revealing their location) throughout the watershed, complete with email contact. The Riverwatcher

program coordinates citizen science water testing, monitoring and advocacy efforts among over 70 volunteers, the majority of them retired and living in homes situated on the banks of the river or in close proximity to it, I came to learn. This was a similar demographic composition to the group of land trust volunteers I met in London, Ont., the previous year, and I became interested in learning more about why people devoted themselves to this kind of grassroots water stewardship at this stage in their lives, what it meant to them as well as how they approached water stewardship in their localities.

I met with staff scientist and wetlands biologist Meaghan Murphy in February of 2016 at the ORK headquarters in the Westboro neighbourhood of Ottawa to explain my project. She permitted me to contact Riverwatchers throughout the course of my fieldwork. My study then became one with a specific object and geographic area of study coordinated around multiple sites, often the homes of Riverwatchers. Murphy and I agreed that images I made throughout my research could be used by the ORK for promoting their work and would also be given to the Riverwatchers I visited afterwards. It was also discussed that I might be able to support people I visit with transition to capturing monthly water testing/observation data digitally in an online site that they would begin using this year. During my second meeting with Murphy, I met Kat Kavanagh, the charismatic executive director of the Water Rangers, the organization with a new web-based, open-data app designed to collect observations about regional water bodies like those being generated by the ORK Riverwatchers, her primary partner organization. Throughout my fieldwork, I saw that the web design work of Kavanagh and her collaborators not only enabled stewardship to be done through smartphones and web-

based technology, but it also created a new experience of collective solidarity, as any other Riverwatcher or citizen with access to internet can easily see the observations of the river being generated throughout the watershed uploaded to the app.

My fieldwork began in May 2016 and was completed by mid-October 2016. During this time, I met over 22 Riverwatchers in places ranging from Portage-du-Fort, Quebec to Grenville, Quebec and many places in Ontario. My explorations of the other kinds of stewardship happening downriver from the Riverwatchers also took me to public parks, local universities, recreation centre meeting rooms and other spaces where water stewardship is organized in different ways, often politically or institutionally.

1.5.2 Participant observation, photography as stewardship and ethnography

The fluid dialogue between words and images that formed my ethnographic research and this thesis reflects my methodology. Participant observation and documentary photography were the main modes of research employed throughout my fieldwork to understand how water stewardship is happening in the Ottawa River watershed. This duality of initiative was oriented and calibrated in ways that enabled me to be actively involved in, or document how, water stewardship happens throughout the watershed in response to change, risk or new threats. As is the case for most ethnographic endeavors, analysis of texts such as news articles, websites, social media, paper-based handouts made by activists and other analogue media also informed my research before and after fieldwork.

My participant observation was often done when visiting ORK Riverwatchers during their monthly testing and observations of the Ottawa River, mostly completed in sections of the river directly offshore of their private property or in specific locations down river. During these visits, I shared in the labour of paddling canoes, taking water or air temperature readings, eventually graduating to reading pH and conductivity levels. In July I was given a Water Rangers citizen science water testing kit by Kavanagh to test water near my home at Britannia Bay or wherever else I travelled. In these instances, walking and traversing the landscape became a component of my methodology in and of itself that opened a broader correspondence between myself and the watershed (Ingold and Vergunst 2008). After shadowing others while completing a majority of my fieldwork, I began independently recording weekly water observations and uploading them to the Water Rangers web app. I also completed observations in locations like Montreal, Sudbury and Oshawa during my travels, completing a kind of remote or virtual participant observation in addition to the directly social engagements I took part in. I became more engaged in the practices of regional water stewardship than I had initially imagined and my participant observation in many ways evolved into full participation. With the knowledge, resources and time available to me to learn practices of grassroots water stewardship, I spent some of the last days of summer and fall outdoors photographing and testing water with my family. As of this writing, I still count myself as a Riverwatcher and a member of Kavanagh's Water Ranger consortium.

I often made audio recordings of the water testing expeditions I went on and conversations that happened during my participant observation. I also meticulously documented the water stewardship I observed and participated in with photographs. Inspired by my initial work photographing land trust and anti-pipeline activism in London, Ontario, I initially designed this project as continuation of my larger photographic work examining the relationships between human and environmental health in Canada. I soon found that this was an ideal path of approach, as using a camera to navigate ethnographic research on water stewardship was not only useful but also necessary throughout my fieldwork. Photographing served not only as a practice of creating a visual ethnographic record, but also as a medium for documenting water stewardship and doing water stewardship.

The scope of my fieldwork and extent of my documentation allowed me to make many photographs of the Riverwatcher volunteer collective which have been given to the ORK for them to use in their communications. Similarly, the pictures I made on several trips as Kavanagh and her staff tested water and demonstrated her app were used throughout the Water Rangers final report to the Trillium Foundation, an agency of the government of Ontario and major funders of the Water Rangers initiative in 2016. While discussing grant application strategies on our drive to Kitigan Zibi in July, Murphy remarked to Kavanagh that when writing grant proposals, the thing that people doing science and non-profit work often forget, but is most important, is the budget for a professional photographer who can depict what you are doing and help with disseminating successful work. During another education outreach visit to Brewery Creek

with Murphy in downtown Gatineau, Quebec, Murphy had me use her camera to photograph as she trudged in hip waders through the low, litter filled section of the creek behind the Brasseurs du Temps brew pub with a group of homeschooled kids to get their hands dirty surveying for tadpoles, crayfish and other indicators of aquatic integrity. The water stewardship done by the ORK, the Water Rangers and other similar organizations depend on images of their work to perpetuate their reputation, legitimate themselves to funders, and engage the public. Photographs were something I was easily able to contribute.

In addition to photographs documenting stewardship, I often found myself photographing water as means of observing and monitoring the Ottawa River and other bodies of water I visited. During water testing excursions with Riverwatchers or Kavanagh, I would often make photos of test sites or ambiguous debris or effluent for while they drew samples from the river. When I began testing water independently with my kit, a complete observation form on Kavanagh's Water Ranger web app is to include a photograph, so I regularly photographed the location of the test site, the view of the water from that point and sometimes the depth of the water, particularly as the river levels began to drop significantly enough that the CBC reported on boats running ashore in some places (Johnstone 2016). Murphy remarked once during my fieldwork that it is vital to get good photographs of pollution visible in the river, as they are the strongest evidence to encourage the government and conservation authorities to act on threats to the integrity of the river. In other engagements with the river and the surrounding environment like naturalist walks through Mud Lake in Ottawa's west end and the

Deschenes Rapids, I found that the camera is a requisite tool for photographing birds and all manner of other species one might come upon at the right time and place. My photography practice blended in naturally with the work of other naturalist and water steward photographers I incurred.

These different practices of photography - depiction of the practice of stewardship and the production of images of water for the purposes of monitoring the environment - were formed using the methodology of documentary photography specifically. Documentary photography, not unlike documentary film, is often referred to as a kind of long-form journalism capable of gleaning insightful stories or narratives from long-term engagement and relationships with subjects. However, my use of documentary photography to research stewardship of the Ottawa River was not necessarily concerned with storytelling, even though knowledge dissemination and the ability of photographic art to communicate ethnographic research to the public are motivations of my methodology. I am more interested in the capacity for documentary photography to chronicle fleeting moments of engagement with water and the landscape, particularly in diverse spaces I only travelled through briefly during multi-sited research or those places where stewardship and political activism exists only temporarily due to several factors. In this way, the body of documentary photography I developed forms a visual ethnography that facilitates photo-elicitation for myself in processing ethnographic fieldwork beyond engagement with the field and those I share my research with (Harper 2002). They sew together an ecology of representations that testifies to the networks of converging stewardship capacity I will write about throughout. Produced using digital single lens

reflex cameras, iPhone cameras as well as analogue film cameras (including underwater cameras), the array of images in these pages are together intended to convey the expansive collectivity that water stewards of all kinds are manifesting through their work within the Ottawa River watershed.

In the pages that follow, I will describe how the convergence of stewardship capacities that emerged on the shores of Lake Wanaki I discussed at the beginning of this chapter reflects the water stewardship of the ORK Riverwatchers, Kitigan Zibi and much of the stewardship work being done within the Ottawa River watershed today. Emergent ecological phenomena, new forms of pollution and capitalist development projects accumulating throughout the expansive Ottawa River watershed in the Anthropocene era are urging the manifestation of new regional forms of Earth Stewardship. My research throughout the watershed illustrated that it was necessary to view these convergences of stewardship capacities that gather to re-configure humanity's possible relation to water as emergent confluences with water - often strategic, creative and imaginative - that can produce new possibilities for ecosystem resilience and survival (Hastrup 2014b: 21).

In chapter two, I will describe my travels through the watershed to meet the members of the ORK Riverwatcher program which Murphy manages. I will first describe the diverse practices of the decentralized group composed of mostly retired individuals who live on the shores of the Ottawa River who test and observe the water. I will then address how their work is informed by the political bureaucracies that they exist within throughout the National Capital Region (NCR) and beyond. Lastly, and stemming from

this political perspective, I will describe how their work is necessarily enabled by not only political bureaucracy, but also collectives of people with diverse localized interests along the Ottawa River and its many tributaries. Finally, in chapter three, bridging out from the collectivity that enables the Riverwatchers, I will describe the network of related stewardship confluences emerging to protect the region from the Energy East oil pipeline. In conclusion, I will consider the prospective significance of convergences of collective stewardship capacities as emerging confluences (Hastrup 2014b: 21) of stewardship that are manifesting in response to regional threats to watershed integrity. I will consider how Latour's notions of collectivity (Latour 1999: 193) between the human and objects and anthropologist Tim Ingold's conceptions of the "meshwork" (2010: 3) between people and their environments enable us to consider how such confluences between the river and stewardship characterize a particular waterworld (Hastrup 2009) unique to the NCR in Canada.



Figure 3 Below the surface of Lower Allumette Lake, Westmeath, July 30, 2016

2 Chapter: Watching the Ottawa River Watershed

Saturday July 30, 2016: Westmeath, Ontario

“Here is your sample point. Westmeath, mid-channel. That’s you guys yeah? We got you in here already!” Kavanagh calls out as she peers into her iPhone at the map interface of her Water Rangers citizen science open data web app as we prepare to test a section of the Ottawa River near the town of Westmeath, Ontario. Located in Whitewater Township in the Upper Ottawa Valley, this part of the river - known as Lower Allumette Lake or just Westmeath Lake - is the place longtime ORK Riverwatchers Evelyn St. Amour and John Meadows call home. For the last three years, Meadows and St. Amour, both retired, have tested water in this part of the river since receiving a testing kit from Riverwatcher coordinator Murphy and Meredith Brown, former executive director of the ORK and the most well-known Ottawa River advocate. However, the pair consider themselves as involved from the start of the ORK, back in 2001. “So this is marked right on there?” Meadows asks of our location from beneath the brim of his hat as he prepares to drop the anchor that will secure his small 1993 Princecraft 162 fishing boat to steady us as we sample. “Yeah, we imported all your data,” says Kavanagh.

Today, Kavanagh, Water Rangers intern Jordan Ross and myself join them in their regular end of the month weekend testing. All Riverwatchers who test the Ottawa River complete their work in the same timeframe to obtain a level of relatively standardized citizen-science accuracy. Since we met back in March of 2016 at the ORK

head offices in Westboro, Kavanagh and I have travelled together throughout the watershed to visit Riverwatchers in the rural and urban places where they live. What was initially an arrangement to share driving and gas costs gradually became friendship and collaboration throughout my summer fieldwork. Being with Kavanagh to see how the technology she has designed is enabling a new collective stewardship practice among the Riverwatchers has brought a perspective to my ethnographic understanding of how water stewardship is being done in the Ottawa River watershed I had not anticipated. The ORK Riverwatchers are the Water Rangers' primary partnership during this, her first full season of having the app up and running, and it is one that serves both organizations well. Having access to previously logged and ongoing data from the ORK database of users gives her water observation technology a head start, allowing her team to work out issues with their design early on. Kavanagh's web app is enabling data entry and statistical labour once performed by Murphy to be done by others. It is in a sense standing in (Latour 1999: 189) for Murphy, freeing her to organize other ORK work. A more profound implication is that Kavanagh's Water Rangers web app is doing much more than just Murphy's former labour. It is also coordinating and analyzing the work of individual Riverwatchers as well as the disparate observations between Riverwatchers and other groups, publishing the data in their open access site online and opening the possibilities of enabling new interventions into watershed issues. In this way, the Water Ranger website itself is an actant (Latour 1999: 180) enabling water stewardship with responsive data programming; one among many non-human technologies such as the Enviroscope hydrology model that enable a collective capacity (Latour 1999: 193) that advances stewardship.

With the boat anchored, Kavanagh and Ross begin discussing testing protocol with St. Amour and Meadows. Their usual aquatic testing process for water quality (pH, hardness, alkalinity, water temperature, air temperature and a Secchi disk measurement for turbidity) and qualitative observations of the environment of the test site (human activity on the river, other species present and any anomalies like pollution or other effluents) is being augmented by Ross and Kavanagh who will help complete other readings. “Do one rinse first Kat” Ross suggests as Kavanagh opens a small plastic sample cup to gather water from the river over the side of the boat, the same kind that one might use for a urine test in a doctor’s office. Making conversation, Ross bluntly asks St. Amour and Meadows if they enjoy doing the testing when they are out on the water. St. Amour’s family has subsisted on this section of the river for generations. She has largely lived her whole life in the area our boat gives us a view of now. Her family made a living on the economy of the river for years, selling blocks of ice cut from it during the winter before electric refrigerators were commonplace and fishing catfish for export to American market when it was once in culinary vogue. In her younger days, she says she dragged sunken logs in the water below us lost from the colonial logging industry to shore to be sold when the ends of them would appear just above the surface of the water. “We just enjoy the river, period. You know, fishing and everything else. This here is just another thing,” St. Amour says of the testing. She and Meadows most often catch bass and pike these days when they do catch something. Meadows has lived on the river here for years and spends most of his time on the water, photographing birds and wildlife

since retiring in 2005 as head of corporate security from the Atomic Energy Canada Limited.

Kavanagh and Ross dip thin multi-coloured paper strips into the sample cup and begin deciphering them to read the water. The strips are the same kind that most swimming pool owners use to test the quality of their water. They use two different brands to compare for accuracy. In my position at the front of the boat, I have strung a thermometer up in the shade from which I will read air temperature when they are ready. In the meantime, I make photos of the process. “Hardness is very...not hard,” says Kavanagh with a giggle. “The river is noted for being soft,” confirms Meadows from his position in the driver's seat. Between their readings they determine the alkalinity of the water to be 60 milligrams per litre and the pH to be 7.8 milligrams per litre, but there is some disagreement about hardness. Ross is reminded to take his sunglasses off, which obscure an accurate reading of the small coloured squares on the strip which are compared to the spectrum of colour on the bottle for the strips. Hardness is found to be zero milligrams per litre. Next, they use a battery powered meter to test for conductivity, which measures the small electric charges generated by particulate matter like calcium and salts in the water. “If it changes over time, it could indicate pollution...like salts...metals” Kavanagh explains to St. Amour and Meadows, who do not have a conductivity meter as part of their kit. Ross takes a reading of 58, which is far less than the 130-range reading we obtained upriver earlier in the day during a visit to Portage-du-Fort, Quebec. “Which is very good,” Kavanagh confirms. Meadows mentions that the river was once being used by the township as a winter snow dump years ago, which he

says increased the salinity of water in the days before he and St. Amour tested. He eventually got both the Ontario Ministry of the Environment and the ORK involved in the issue. I report 32 degrees Celsius for air temperature to Kavanagh when the conversation breaks.

Next, Kavanagh and Ross show St. Amour how to test for dissolved oxygen, a test she and Meadows do not usually do which reads the oxygen content of the water, a key indicator of how fit a body of water is for carrying the life of other species. A small test tube of water is filled, combined with solution and snapped to create a reaction. A comparison to a small gallery of model tubes arrayed on white cardboard elicits a reading of 9 milligrams per litre. Meadows then helps St. Amour lower the circular, black and white Secchi disc into the water on slim white nylon rope. Part of all Riverwatcher kits, the basic disc measures how clear or turbid a body of water may be. The rope is marked by Meadows with a clip and measured at 1.8 meters, the point at which the disc begins to disappear in the water. Kavanagh has been keeping track of all the data generated to this point, but when they arrive back to Meadows' home, St. Amour has agreed to have Kavanagh walk her through the Water Rangers app on Meadows' home computer so that she can upload their future test results. The final test for the day is for microplastics.



Figure 4 Figure 4 Microplastics testing, Lower Allumette Lake, Westmeath, July 30, 2016

During the annual Riverwatcher meeting at Ferme Moore in Gatineau, Quebec in June 2016, Carleton environmental science professor Jesse Vermaire and two of his students gave a short presentation regarding his summer study on microplastics pollution. Microplastics are infinitesimally small particles of plastic that accumulate in water, including microbeads emitting from many household consumer items like soaps and toothpastes (varieties of which are not banned in many places) as well as clothing made of synthetic materials like fleece. Vermaire brought a load of microplastics testing kits to the meeting which were taken home by Riverwatchers and used throughout the summer. Ross handily assembles the kit, a handheld filter with a special screen installed to capture the plastics, and jug for drawing and pouring water through the filter. Everyone takes turns drawing water from the river and pouring it into the filter to fulfill the twenty-five dumps of water from the jug through the filter necessary to complete the test. Meanwhile, Meadows tells me stories of photographing a humpback whale in a Kayak on the west coast years ago as Kavanagh Ross and St. Amour laugh and struggle to keep track of pouring. “I used to be a hunter, but now I hunt with the camera,” Meadows says. St. Amour mugs for Kavanagh who takes pictures on her phone to send back to Murphy. “Can you take the filters back with you?” Meadows asks Kavanagh. “I’ll mail it in. You just mail them in,” offers Kavanagh. “I’ve got another one to mail in too.”

What can be seen in the filter? Everyone wants to know. “Can you see any sediment?” asks Meadows inquisitively. “Not really sediment, but you got a few pieces of zooplankton kicking around,” says Ross. “Is there any gold in there?” jokes Meadows. St. Amour mentions seriously that there may actually be gold particulate in some places

along the river, as she has seen small granules reflecting sunlight on the shore some particularly sunny days. The process reminds Kavanagh of a specialized net the Rideau Valley Conservation authority is using to monitor the emergence of the spiny water flea; a newer invasive species being found in the region. Meadows notes that he read that you must be careful to not wear any clothing containing microfibers while testing so you do not compromise the microplastics sample. The issue of microplastics pollution and its relative invisibility are a new threat to the integrity of the watershed that has taken Meadows by surprise. “That’s a totally new bad guy to me.”

Four days later and just over a two-hour drive from Kitigan Zibi, this convergence of people, technology and water created a different confluence of water stewardship capacity than the one I took part in on the beach at Lake Wanaki in Kitigan Zibi. In contrast to the education, experimentation and exchanges that Murphy, Kavanagh and I were invited to foster with youth at Cultural Camp, our engagement with St. Amour and Meadows was characterized by the possibility of enhancing the capacity of their skills as citizen scientists and advancing the data collection process of a scientific study run by a researcher at a prominent university in the NCR. This confluence between the people, organizations, technology and the river manifested in new data that may inform how microplastics contamination in the Ottawa River watershed is addressed in the future. The sample taken with St. Amour and Meadows that day yielded 5 microplastics (mp)/100 L, a low count versus the 13.5 mp/100 L mean value collected in total by the

Riverwatchers and the 45 mp/100 L found by another Riverwatcher in Green's Creek in the eastern parts of Ottawa (Email to author 2017), a more likely place to focus on the microplastics problem than the Lower Allumette Lake section of the river in Westmeath. However, what is the cultural significance of the enumeration of the river and its contents that characterizes this confluence of ORK Riverwatcher water stewardship?

The waters of the river in this part of Westmeath were enumerated according to an assemblage of scientific and citizen science methods in this afternoon engagement, and in many ways, this was the main purpose of our visit. However, the river was also read with the situated, place-based historical knowledge of Meadows and St. Amour. Indeed, even in our brief engagement with Meadows and St. Amour, their situated knowledge of the Allumette Lake section of the river that we travelled through enriched our collective understanding of the water. In addition to confirming the softness of the water, their extensive experience fishing the waters enabled an insight into the vitality of fish populations, while Meadows' recounting of the practice of dumping snow into the river by the municipality of Westmeath indicated how fleeting and discreet actions regional governments contribute to the cumulative impact on the ecological health of the river and the broader watershed. Towards the end of our time together, we also learned from St. Amour and Meadows that the light brown inflection of the waters is coloured by the tannins emitted from sunken logs lost by the colonial logging industry (see illustration 03), showing us that colonial history still constitutes and characterizes the watershed today and their lives in it. As Keith Basso recognizes in his work on situated knowledge, it is crucial for ethnographers to account for the implications of dwelling,

“the ways in which the citizens of the earth constitute their landscapes and take themselves to be connected to them” (Basso 1996: 54).

The collective work of the Riverwatchers is structured around hydrology, watershed management and the gathering of numerical data that supports those models but is constituted by more than just the quantitative. Bruno Latour, in his study of fieldwork by soil experts, recognizes an ambivalence in the collection of quantitative data by scientists, noting that “The sciences do not speak of the world, but, rather, construct representations that seem always to push it away, but also to bring it closer” (1999: 30). However valuable scientific knowledge may be in some capacities of water stewardship, it is a particular form of knowledge with a particular affect in the realm of water stewardship. Anthropologist Shaylih Muehlmann’s critical research on the practices of scientific enumeration in Mexico’s Colorado River Delta (2012) found that the counting of dwindling species of birds, fish and others - as well as Indigenous language speakers in the area and the very river itself - culminated in the development of qualitative valuations that increase scarcity and encourage a narrative, or even a monetary valuation, of endangerment (Muehlmann 2012: 349). Kirsten Hastrup also recognizes that numbers are “abstractions, not realities” and that they are often developed to facilitate what requires numeration in the first place (2013: 61). Much like Muehlmann accounts for the “rhizomatic” resistance of enumeration by the human and non-human in the Colorado River Delta in her work, Hastrup draws attention to the transformative power of water as finds confluence with the world in its path:

It bends and twists the human perception of resources and rights, and transforms social and moral values all while it flows according to the laws of gravity and liquidity. Social life along the river is both configured by and configures the flow of water (2013: 61).

Science, citizen science and the enumeration they employ in reading and understanding water chemically are central evaluations of water that exist within many others. The confluences of water stewardship I have observed in Kitigan Zibi and Westmeath illustrate that such evaluations are strengthened and even made possible by the sociocultural knowledge gleaned from dwelling in places. In this instance at Westmeath, developing an understanding of the emerging, sometimes invisible dynamics of threats to watershed integrity such as microplastics pollution require the orientation, knowledge of place and affective labour of those who dwell here. Water stewardship is rooted in complex, lived actualities that can account for such entangled, physically and socially diffuse pollution problems like microplastics not just unidirectional, causal links between society and water (Hastrup 2014b: 21).

Throughout the rest of this chapter I will describe my further exploration of ORK Riverwatcher stewardship during my fieldwork conducted from May to September of 2016. To begin with, I will outline the mandate, composition and scope of the Riverwatchers work today as it relates to the larger work of the ORK. As Murphy told the youth assembled at Cultural Camp, despite the central role and responsibilities of governments to the environment, the Ottawa River watershed is a body of fresh water too large for all governments and agencies in the national capital region combined to

accurately monitor. The ORK and Riverwatchers are therefore engaged in work that is fundamentally defined by or against the stewardship that political bureaucracies are or are not doing, a second dimension I will address. There is a close relationship between governments and water stewardship being done by the Riverwatchers, however, my research found that political bureaucracy is only one of many factors that informs the volunteer labour that composes the stewardship of the Riverwatchers. In the final section of this chapter I will describe the practices of Riverwatchers and the expansive intersections of individuals, community groups, organizations, materials, technology and other species that form the confluence of stewardship capacity that is the broader work of the ORK Riverwatchers.

2.1 Mandate, Composition and Scope of the ORK Riverwatchers

Much has been written in newspapers articles and website pages about the ORK as the preeminent organization taking on the job of protecting the Ottawa River watershed in a way that transcends - what the ORK considers to be - the divided approaches and piecemeal regulations of regional governments (Ottawa Riverkeeper 2017c). As I have noted, the ORK is widely considered in the NCR and beyond as the central organization responsible for the stewardship of the Ottawa River watershed and its many tributaries. Season upon season, Brown and the ORK are often the first or only group quoted when newsworthy phenomena emerge from the river such as the NCR floods of spring 2017. The ORK is affiliated with high profile politicians and is sought out by community groups, corporations and researchers like Vermaire or I for research

collaboration. The organization has been responsible for coordinating significant efforts on behalf of the Ottawa River between governments like the Gatineau Declaration (Ottawa Riverkeeper 2017a) and enabling the public to take action on the river themselves with tools like phone hotlines for reporting pollution and other impacts on the river. For my purposes, here, I will only briefly address that lineage as it relates to contextualizing the Riverwatchers. My main concern is to describe the Riverwatchers' role in the complex cultural ecology that has developed to steward the Ottawa River watershed, which ranges 1,271 kilometers from its source in Lake Capimitchigama to its mouth at the convergence with the St. Lawrence River (Ottawa Riverkeeper 2017f). According to a map of only the publicly disclosed Riverwatcher locations, there are ORK Riverwatchers affiliated with the ORK as far north on the river as Ville Marie, Quebec and as far south-east as Pointe Monk in Montreal at the confluence with the St. Lawrence.

The Ottawa Riverkeeper began in 2001 when Brown, Algonquin College educator John Almstead and Ottawa citizen Lara Van Loon-the first Ottawa Riverkeeper-sought to formalize their local work on behalf of beaches along the shores of the river in Ottawa neighbourhoods like Westboro. This small collective eventually modelled their fledgling organization on the Waterkeeper Alliance founded by Robert F. Kennedy Jr. and the work done to steward the Hudson River in New York, becoming the third Canadian Waterkeeper program to be formally licensed by the Waterkeeper Alliance (Ottawa

Riverkeeper 2017e). It is worthwhile to briefly consider the ORK articulation of the role of the Riverkeeper under which the Riverwatchers work:

A WATERKEEPER is a full-time, non-governmental ombudsman whose special responsibility is to be the full-time public advocate for a water body. Fundamentally, it is the waterkeeper's job to advocate compliance with environmental laws, respond to citizen complaints, identify problems that affect his or her body of water and recommend appropriate solutions. Waterkeepers are leaders in ensuring that communities maintain control over their local waterways when threatened by development, industrialization or toxic pollution (Ottawa Riverkeeper 2017e).

It is also worthwhile to consider these further stipulations of the ORK's perspective on the role of waterkeepers in Canada.

We are leaders in ensuring that communities maintain access and control over their local waterways, when threatened by development, industrialization, or toxic pollution; We are Canada's most skilled citizen enforcers of the federal Fisheries Act – the most powerful environmental law in the country; We are activists, working directly with communities to ensure they have fair and open decision-making processes on environmental issues affecting them (Ottawa Riverkeeper 2017e).

Many of the Riverwatchers I met count themselves as being acquainted with Brown and involved as Riverwatchers from sometime around this early beginning when membership was initiated by responding to ORK newspaper ads or calling the ORK

offices to report issues in their communities. The Riverwatcher program was not formally created until 2005, though. For years, the group grew steadily as a network of concerned citizens acting on behalf of the river, however, the collective of volunteers and its stewardship capacity as it exists today did not take shape until 2013 when Murphy was hired as Riverwatcher coordinator with a Tides Canada Dragonfly Fund grant (Email to author 2017). Murphy introduced further training for existing and new Riverwatchers, gradually expanded the network and began to introduce the Water Quality Testing Program currently run primarily through the Riverwatcher volunteers (Ottawa Riverkeeper 2013a). Qualitative observations of the river and advocacy around impacts to it, like Meadows' call regarding municipal snow dumping in the river to the Ontario Ministry of the Environment, became strengthened by the distribution of kits for water testing that people could do independently. The solidarity of the social network that makes the Riverwatcher collective cohesive was also strengthened after Murphy was hired, as Murphy, Brown and other ORK staff personally visited Riverwatchers to distribute kits and train them. These were times that people remembered fondly when I asked them to recall how they became Riverwatchers.

In 2013, The Mississippi Riverwatchers - those stewarding the tributary to the Ottawa River, not the American river of the same name - also joined the ORK Riverwatchers as a sub-group as did the Ottawa chapter of Muskies Canada, an association of musky fishers who signed a memorandum of understanding with the ORK (Ottawa Riverkeeper 2013a). Today, the ORK website notes that there are 50 Riverwatchers currently working with the program, however, a June 14, 2016 CBC news

story on the collaboration between the ORK and Kavanagh's Water Rangers initiative reported the number of Riverwatchers as being "an army of 75" (Panico 2016).

Throughout my fieldwork I utilized the rough number of just over 70 to estimate the size of the larger social group that I was studying, which was floated to me early on in my fieldwork by Murphy. However, I quickly came to learn how the number of Riverwatchers at any given time was often relative as membership in the group is premised on multiple levels of participation in the program based on the skills, resources and time that individual Riverwatchers possess. According to the ORK website, "Riverwatchers identify themselves with specific sections of the river or a tributary and become involved in ways that reflect their own interest, time and skills" (Ottawa Riverkeeper 2017f).

Throughout my fieldwork I individually met just over 22 Riverwatchers - including people like Murphy and Brown - practicing stewardship in very different ways in places ranging from Portage-du-Fort, Quebec to Grenville, Quebec and many Ontario locations in between. Many people I got to know are fully versed in basic Riverwatcher citizen science water testing protocol as well as other more nuanced methods such as the conductivity and dissolved oxygen testing Kavanagh and Ross demonstrated to St. Amour and Meadows. However, others I visited only casually observe and report on local issues impacting the river to the ORK from their riverfront properties or communities and there are others still within the region who only count themselves as honorary Riverwatchers, but do not align themselves with the same testing protocol or stewardship ethos. As the ORK website notes, the observation, testing and advocacy that

Riverwatchers do is important but, more than just being the “eyes and ears” of the river and the watershed, the Riverwatchers help to build community (Ottawa Riverkeeper 2017f). This is not only one of the most significant outcomes of the Riverwatchers’ stewardship work, it is also at the foundation of what they are, as most of the Riverwatchers I met are heavily involved in other community volunteer efforts. Throughout my fieldwork, I found that the work of the Riverwatchers is constituted by complex webs of community affiliations that are centred in the localities they live within and extend throughout the watershed.

Before exploring these important dimensions further, I want to examine the how the work of the Riverwatchers is constituted by the governments that communities elect to represent them and the political bureaucracies that are constructed to administer governance. To this point I have indicated that that the Riverwatchers and the ORK are influenced by what government does or does not do to steward the watershed, however, political bureaucracy also constitutes the work of the Riverwatchers in other personal ways that are more profound than it would seem at the outset.

2.2 Government, political bureaucracy and the work of the ORK Riverwatcher program

Sophie Grégoire-Trudeau stated that “water is not a political subject,” ORK executive director Patrick Nadeau tells a journalist and camera operator from the Cable Public Affairs Channel with certainty as he reflects on her speech at the 2016 ORK Gala

on Lemieux Island within the river (Canadian Public Affairs Channel 2016). Grégoire-Trudeau was given the distinction of Honorary Riverkeeper at the event in June 2016, during which she spoke about the significance of water, water quality and access to water. I was not able to find footage of her address that specified the apolitical nature of water, however, she did say this:

Water represents more than family time and fun. It is purity, it is life force and life source. As my colleagues have said before, it is where we come from. From my travels here and abroad, I have seen, unfortunately, the reality of people who do not have access to clean water and it's happening right here in our own country. Throughout the world, 41 per cent of the world's population live near river basins that have water under stress. It shouldn't be a luxury to have access to clean water. Here in Canada we have communities without access to clean water and most of them are First Nations (Canadian Public Affairs Channel 2016).

Rectifying the grave inequity in access to clean water among First Nations was political campaign promise made by Justin Trudeau during his 2016 campaign to be elected prime minister of Canada (CBC 2015a). Grégoire-Trudeau's status as Honorary Riverkeeper, her presence at the Gala and her speech all signal that regardless of whether water is or is not an inherently political element of the world, the broader stewardship work of the ORK - and the Riverwatchers by extension - on behalf of the Ottawa River Watershed is significantly constituted by regional government and political bureaucracy. My research found that the water stewardship work of the Riverwatchers is characterized by confluences of collective engagement with the river, however, few confluences have

as foundational or persistent an influence as those formed with regional governments and their political bureaucracies. Throughout my time with the ORK Riverwatchers, I found that the governmental culture of the NCR deeply influences the work of the Riverwatchers. The Ottawa River watershed is home to not only the federal bureaucratic centre of Canadian politics, but also multiple First Nations, provincial and municipal jurisdictions that influence how stewardship of the Ottawa River watershed and other regional water bodies is accomplished.

The gala was also attended by Claudette Commanda, an ORK board member, Kitigan Zibi elder and grand-daughter of revered late Kitigan Zibi elder William Commanda. The late Commanda was a vocal opponent to controversial development within the Chaudière Islands section of the river and proponent of the construction of a First Nations international meeting centre on nearby Victoria Island (asinabka.com 2017). Green Party leader Elizabeth May is given time in the CPAC video to tell the story of how in her time as director of the Sierra Club of Canada, she helped to find funding for the ORK when it began (Canadian Public Affairs Channel 2016). Federal minister of the Environment and Climate change Catherine McKenna attended the gala and participated in the annual four-kilometer fundraiser swim race from Shirley's Bay to Aylmer Beach held by the ORK in the summer of 2016. In addition to Grégoire-Trudeau, ambassador to Ireland and former sergeant at arms Kevin Vickers, Bank of Canada governor Stephen Poloz, current governor of the Bank of England Mark Carney and Ottawa mayor Jim Watson are among those listed as honorary Riverkeepers on the ORK website (Ottawa Riverkeeper 2017g). Far from symbolic, the political capital of the gala attendees and

honorees enhances the public profile of the ORK, which undoubtedly helps in leveraging donations like the \$100,000 given to the ORK by the Royal Bank of Canada at the event this year (CPAC 2016). Official government grants accounted for \$57,271 of the 2016 ORK budget (Ottawa Riverkeeper 2016a), but political and financial currencies are not the most direct means in which the government and political bureaucracy inform the work of the Riverwatcher program.



Figure 5 Riverwatcher Al Twedde leading a tour of Petrie Island, May 07, 2016

2.3 The bureaucratic lives of Riverwatchers

On an island in the Ottawa River within the suburb of Orleans last June I began to learn that the one of the most important ways in which government informs the work of the Riverwatchers is through their former employment in different levels of political bureaucracy. Riverwatcher Al Tweddle and I were walking around Petrie Island Park on a Wednesday, the day of the week that his Friends of Petrie Island collective volunteers to improve the grounds and park infrastructure of the aggregate section of islands formed by sand deposited 12,000 years ago during the last ice age (Friends of Petrie Island 2017). The group has done conservation work on the island since 1997 after successfully rallying public support against plans by the City of Cumberland to develop a marina, picnic area and bridge to Quebec from the island. Murphy lives close by and has been involved in doing outreach on the island on behalf of the ORK for years, Tweddle tells me. He is “on the books” as a Riverwatcher, but he does not test or do formal observations, it is more of an affiliation. He does his part by maintaining the ecological integrity of the island. Small community conservation areas like this exist in many places throughout Ontario where development and urban sprawl threaten local ecosystems. What about the stewardship that he does here and his role as a Riverwatcher - however symbolic - are unique to Ottawa? “I don’t have answer for that,” says Tweddle, gazing out at the river while keeping half an eye on a crew of city workers who just felled a large dead tree meters from where we stand. “But, there are all kinds of federal departments who have trained scientists...who live in Ottawa and work in Ottawa and some of them

retire and do this kind of thing, so I think we're fortunate that way. We have a lot of green space as well."

Tall and clean shaven, wearing a fishing hat the kind of plain jeans and a sweatshirt one dons when doing gardening work, Tweddle was not always chair of the Friends of Petrie Island. Prior to retiring, Tweddle was employed as a technologist in the chemical engineering division of Canada's National Research Council where he worked on reverse osmosis and water purification processes, as well as membrane technology. Tweddle's research on membranes is widely referenced, particularly his work on the use of membranes for processing crude oil, exemplified in collaborative papers titled "Use of Membranes for Oil Upgrading" (Tweddle et.al. 1985) and "Upgrading of solvent extracted Athabasca bitumen by membrane ultrafiltration" (Tweddle et.al 1990). "It was only in the early sixties that the first membranes were made. Today, there's millions...billions of gallons of stuff being purified," he tells me. In 2008, Tweddle was given a United Way Community Builder Award for his work on Petrie Island and the larger community of Orleans (Plouffe 2008). Tweddle's experience in scientific public service is not unparalleled among the Riverwatchers though. Howard Powles, current president of the Deschenes Residents Association-a local organization that documents and stewards the natural area around the Deschenes Rapids near Gatineau, Quebec-worked as a fisheries scientist for the federal government for years. He ended up being employed by the Department of Fisheries and Oceans from 1993-2005, finishing his career as director of Fisheries Science and Coordinator of the DFO Species at Risk

program after the Species at Risk Act was passed in 2002. These were the good old days,
Powles wrote to me in an email.



Figure 6 Riverwatcher Howard Powles at Deschenes Rapids, August 12, 2016

People from many realms of public service form the Riverwatchers collective. As I learned from a faded logo on an old agency t-shirt he was wearing during our weekend testing expedition in Westmeath, our host John Meadows worked in the security division of the Atomic Energy of Canada Limited - the crown corporation charged with managing Canada's radioactive waste and enabling nuclear science and technology (Atomic Energy of Canada Limited 2017) - from 1981 until retirement in 2005. The list is too large to describe exhaustively here, but some other examples include a communications director for Library and Archives Canada (who also held positions in National Capital Commission public relations), an IT technician for the Department of National Defense, a clerk in the House of Commons, and Canadian Airforce medic with 33 years of service. This affiliation with government is prominent, but is not universal. In my travels to Constance Bay near Ottawa I met Dr. Sara Simkin, a currently practicing physician and mother of two who tests the section of the river in front of her house monthly. In some of my furthest travels east to the small town of Grenville, Quebec, I met Ian Young, a retired businessman who now makes a living maintaining investments in solar energy farms.

However, enough people have had a formal employment relationship with the government to recognize it as one of the defining biographical characteristics of the Riverwatchers as collective that has voluntarily taken on the tasks involved in stewarding the Ottawa River in the NCR. As Tweddle mentioned to me during our walk around the wetlands and turtle sanctuaries of Petrie Island, the stewardship of the Ottawa River and the watershed that he and other Riverwatchers engage in is done in the NCR, a

geographic and ecological space that is also the bureaucratic centre of federal politics in Canada and is defined by the intensive federal management of land within agencies such as the National Capital Commission, which guides the use, physical development and management of approximately 13 per cent of the 4,715 square-kilometer Capital Region (National Capital Commission 2017). Maybe there are just enough people around whose life work this happens to be and they therefore want to carry it on even once they are no longer being paid salaries for it. Meadows thinks that it is probably sheer co-incidence that so many of the Riverwatchers have a depth of experience in government, however, he also recognizes his drive to serve and protect in his water stewardship. This past winter he wrote to me:

(It would) probably depend on what an individual did for the government, but I always had a sense of serving my country. A good portion of my time was spent on granting security clearances (through CSIS and Treasury Board). My signature was on every one. This also entailed revocation when needed. A lot of thought goes into the process and administration of the Government Security Programme (GSP) and (it) has to be taken seriously. You can imagine the potential ramifications if a malevolent person has access to a sensitive area. I felt I had a duty "to protect", if you will, not only the site where I worked, but the Canadian public at large. This same mind set might be applied to one volunteering to "protect "our beautiful river, for everyone to enjoy. I think not only of my generation right now, but for my granddaughter and grandsons, and all generations in the future.



Figure 7 Riverwatcher Bob Simpson, Portage-du-Fort, Quebec, July 30, 2016

2.4 Doing water stewardship while holding political office

Before visiting Meadows, Kavanagh, Ross and I travelled to Portage-du-Fort, Quebec where we met Bob Simpson a Riverwatcher who configures an even closer, more nuanced relationship between water stewardship and politics than most as a both a Riverwatcher and town councilor. Since moving to his cottage home in Portage-du-Fort around 2010 after retiring from work in the engineering department at Bell Canada for 38 years, Simpson has been stewarding his section of the river by many different means. Silver-haired, tanned, mustached and charismatic, he first became involved with the Riverwatchers in 2012 when he advocated for Brown and the ORK to get involved in issues surrounding a septic waste treatment plant that was operating upriver from their home on the site of a former wood pellet mill in an industrial park in Litchfield, Quebec. Afterwards, Brown invited him to become a Riverwatcher for the area, and since then, Simpson has remained heavily engaged in advocacy in his role, rallying against the establishment of a contaminated soil transfer site in the same Litchfield, Quebec industrial park where the septic waste treatment plant was installed. An August 14, 2013 article in the Pontiac Journal written by freelance journalist and Bristol, Quebec Riverwatcher Deborah Powell describes an extensive list of concerns around storage capacities and overflow risk at the transfer site vocalized to the community by Simpson (Powell 2013).

In the fall of 2013 Simpson felt he could contribute even more to help the town, so he ran for council, and won a seat. During his time as a councillor, he has worked on

several regional issues with former politicians like Barry Stenshorn, a regional Riverwatcher affiliate and former assistant deputy minister for the Environmental Protection Service at Environment Canada during Paul Martin's Liberal government and current regional politicians like Will Amos, environmental lawyer and MP for the riding of Pontiac and Andre Fortin, provincial representative for the riding of Pontiac. However, in the last two years, Simpson is growing tired of his role as town councillor due to ongoing problems with resident access to potable water. Water use has begun to exceed local capacity, which was further hindered by complications with the capacity of a water plant installed in 2013. Shortages have seen residents in 15-20 homes running hoses from house to house in the winter or boiling snow for potable water (Gosselin 2015). Simpson has tried to work with the provincial and federal government to find long-term solutions to the shortage issues, but he has run into many barriers.

He says he will not run again after his term is up next year, even though the mayor wants him to, but his role as a Riverwatcher is different. "Riverwatcher is something I'll stick with forever," Simpson told me over the phone this winter. The spectrum of environmental work that Simpson has done in the area has been accomplished through his tandem roles and skills as Riverwatcher and politician. Being on council opens doors and gives him inside information with what is going on with the Pontiac country regional municipality (MRC). It also gives him a legitimacy on issues that is harder to negotiate with the environmentalist connotations of Riverwatcher that he feels some conservative people in the area are averse to. Sometimes telling people you are a Riverwatcher these days is a really good thing, Simpson says, since Brown has

done so much to promote the role of the ORK in watershed stewardship. On council, being a Riverwatcher makes him responsible for addressing issues like a recently proposed trailer park with poor environmental impact planning and other building code violations that can threaten the shorefront. “Being a councillor and a Riverwatcher really helped, they go hand in hand,” says Simpson.

2.5 The environmentality of Riverwatching

The water stewardship work the ORK Riverwatchers do in the NCR, while distinct from the work done by any level of government or the conservation authorities they fund, is uniquely constituted by the central role of government bureaucracy - particularly the federal government - in the region’s culture and economy. Useful once more is Trawick’s notion that the moral economies of water we develop in water stewardship are, “a product of the unfolding of nature and culture together, of their mutual transformation” (2001: 374). As Tweddle and Meadows indicated to me in plain terms, the NCR is a place where trained scientists or employees formerly of the federal bureaucracy populate the landscape and in many ways, “naturally” want to maintain their vocational calling to mediate human impact on their immediate environment or their duty to protect in general. Places like Petrie Island and Deschenes Rapids have been administered with personal conservationist passion (Rubow 2016) by Tweddle and Powles, complete with garbage cans, education centres and didactic panels describing history as well as surrounding flora and fauna. In Simpson’s case, political practices were adopted to achieve goals that the role of water stewardship could not accomplish alone.

Similarly, Sheila and John Jones, two Riverwatchers who are also affiliated with the Friends of Brewery Creek group in Gatineau have been steadily testing a section of the creek near downtown Gatineau in order to directly gather data on E. coli content in the water that will motivate the municipal government there to act on combined sewage overflow pipes that are reducing the integrity of the creek and, therefore, the Ottawa River. The forces of bureaucratic management in the NCR permeate the diffuse barriers of individual water stewards' livelihoods and characterizes the impetus as well as the nature of the water stewardship practices that most Riverwatchers employ.

This merging of citizen environmental activism and government jurisdiction raises the question of the role of environmentality in the work of the water stewardship of the Riverwatchers, the notion that environmentalist work is an extension of the “logics, projects and movements” found in Foucauldian governmentality (Agrawal in Cepek 2011: 503). In his case study of the role of environmentality in an Ecuadorian conservation project involving the Cofán people and the Field Museum of Natural History, anthropologist Michael Cepek references Arun Agrawal’s argument that environmental subjects - individuals who have been “environmentalized” by the projects, programs and processes of government bureaucracy - use practices to mediate human impact upon the environment that are ultimately defined by their immersion in networks of government power (2011: 503-504). Cepek found that the Cofán subverted the processual domination of environmentality by employing a critical consciousness towards scientific enumeration and the methodologies of the Field Museum, instead engaging in the conservation project from their own situated perspectives of the

landscape (2011: 512). Environmentalism is a useful lens through which to consider the work of the Riverwatchers. As environmental subjects, the Riverwatchers are completing a volume and quality of water quality monitoring and observation that governments combined are not doing and, arguably - given the niche geographic areas they are monitoring that traverse private and public terrain - could not do within the scope of budgets and human resources available. The ORK and the Riverwatchers define themselves by the presence or absence of government water stewardship, policy and action. Their work is highly informed by their career expertise, former or current immersion in government and is done in coordination with local government in many cases.

As Tweddle and Meadows' comments highlight, rather than being expressly "environmentalized" in Agrawal's sense by government practice, the ways in which government bureaucracy exists within the cultural ecology of the enduring colonial landscape of the NCR may create a more "inherent" co-constitution between the government and the practices of Riverwatchers. This is not to say that the federal political bureaucracy of Canada's NCR is in any way natural to the landscape in the NCR. The youth of Canada's colonial statehood and the long history of Algonquin tenure and stewardship that preceded it certainly disqualify this idea. My research indicates that there is a co-production of capitalist political bureaucracy and nature (Smith 1984: 397) within the unique economy of the NCR that may find no clear delineation in the metabolism of regional political and cultural ecologies. The centralized resources of the federal capital and other regional political bureaucracies, its intense reliance on the

aesthetic prestige of the landscape to underscore the architecture of its power and the tourist economy that constitutes it arguably create a closer symbiotic relationship between the bureaucracy and nature than other Canadian cities. In Canada's NCR, there is a blending of the exchange values of federal bureaucracy and the use values of citizenry described by Williams (2001: 427) in his study of the Anacostia River - the American capital city watercourse in Washington - that contests the notion that human unity with nature will be found only in Marxist socialist governance (Smith 1984: 397).

However, as I have mentioned above, the work of the Riverwatchers isn't defined or constituted purely by the political. The work of the ORK and the Riverwatchers is in many ways a kind of Earth Stewardship; a definition of water stewardship that involves "shaping trajectories of social-ecological change at local-to-global scales to enhance ecosystem resilience and human well-being" (Ecological Society of America 2017) using an assemblage of strategies to address complex layers of problems. Far more than just a non-profit citizen environmental program informed by political bureaucracy, the work of the Riverwatchers employs community education, technology such as the Water Rangers web app and collaborative citizen science to address emerging threats to the Ottawa River watershed. Despite the overwhelming influence of political bureaucracy on the life experiences of many Riverwatchers and the necessary symbiotic relations the ORK as an organization has with many levels of government, the work of the Riverwatchers as a decentralized group of volunteers is configured by much more. It is useful to refer to Hastrup's ideas again here. The Riverwatcher's work in localized areas such as Portage-du-Fort and Lower Allumette Lake in Westmeath where Meadows and St. Amour live

and test water configures confluences of possible human imagination and interest (Hastrup 2014: 21) necessary to steward water amidst emerging threats, or “new bad guys” like microplastics, as Meadows put it during the morning we converged to carry out Vermaire’s (2017) microplastics sampling. These confluences, however episodic they may be or gradual in their impact, begin to configure a new relationship between people and the water they depend on and enable people to “fashion their life according to their understanding of water’s course and force” (Hastrup 2014: 03). This dimension of the Riverwatcher’s work, as I will show below as I conclude this chapter, is crucial if the people of Canada’s NCR wish to retain the social world we they live in, a world which is truly enabled by the stability of their relations with water.



Figure 8 Demonstrating against Enerdu, Almonte, Ontario, July 23, 2016

2.6 Confluences of water stewardship emerging from the Ottawa River

July 23, 2016; Almonte, Ontario

On the banks of the Mississippi River, I stand with citizens and passersby to watch as a swimmer, wearing a baseball hat, t-shirt and shorts slowly immerses their body into the deep, slow moving water, holding a sign just above water level baring the slogan “Save our River, Stop Enerdu.” Around the bend from where the swimmer wades, below a main bridge and in full view of a small crowd of casual supporters signaling their solidarity by wearing red, other swimming activists float through the water alongside kayaking and canoeing allies in their fight. Their collective presence in the water is a display of support for the Mississippi River (not the noted American river, but the identically named Canadian watercourse) which flows through this small Ontario town. This stretch of it has been the subject of much controversy. For six years, concerned citizens of Almonte have campaigned against the construction of an intrusive hydro dam by the company Enerdu in this central, but sensitive downtown section of the river surrounded by heritage buildings. The dam would increase risk of flood in the downtown core, ruin the aesthetics and moreover, they just did not need the power or revenue from it, people told me. It also happens to be a natural habitat for the endangered Gomphus quadricolor, or Rapids Clubtail Dragonfly (Province of Ontario 2017). Two weeks before my visit, the Mississippi Riverwatchers, the Mississippi Mills Riverkeepers and their allies attempted to invoke the threat the dam would pose to the insect as a last line of defense after appealing to local, provincial and federal politicians to no avail (Battersby 2016). As of this writing months later, construction of the dam is still underway, with

local residents continuing to oppose the development, now criticizing the persistent noise and late working hours of the construction crews through the winter (CBC 2017).

I learned of the plight of the Almonte residents and the Mississippi Riverwatchers via the map on the ORK Riverwatchers website. Mike O'Malley is a central member of the Mississippi Riverwatchers also listed as an ORK Riverwatcher (Ottawa Riverkeeper 2017), however, I was not able to connect with O'Malley in my travels to Almonte due to his busy schedule. The ORK has supported Almonte resident's efforts against the dam by advertising their petition via social media (Ottawa Riverkeeper 2014) and former ORK executive director Meredith Brown previously presented at a community meeting on the dam construction in 2013 (riverwatchers.ca 2017). Much like the Cultural Camp at Kitigan Zibi, The Mississippi Riverwatchers, in their direct support for part of the Ottawa River watershed, is one of many formal groups that constitutes the broader membership and solidarity of the ORK Riverwatchers. Similar to the relations with and experience in government bureaucracies that co-constitute their work, the ORK Riverwatchers are composed of an extensive network of water stewardship initiatives; a constellation of individuals and groups who create unique confluences of community-based affective environmental labour supporting, "the production and reproduction of life" (Hardt 1999: 100) that attend to the integrity of the Ottawa River or to tributaries of the river in different ways.

Whether they are dedicated Riverwatchers who test monthly and advocate on behalf of the river to local government or affiliates who can be called on to make

observations of ecological change or emerging development concerns in their area, the map of Riverwatchers on the ORK website is populated by members of a spectrum of collectives with varying degrees of vested interest and expertise. Members of the Friends of Brewery Creek, the Friends of the Gatineau River and the Friends of the Kipewa River are among those who do work on behalf of tributaries in confluence with the Ottawa River, however, groups like the Ottawa chapter of Muskies Canada (a musky fishing association), Old Fort Williams Cottagers Association, Owl Rafting, the Bytown Brigantine, Ottawa Rowing Club and the Rockcliffe Yacht Club also support the river and the ORK's work, despite their recreational focus. The ORK Riverwatchers counts individuals from these groups as part of its membership, and many are given the support of water testing kits, advice on proceedings in local issues or moral support, as in the case of the Mississippi Riverwatchers. This cultural ecology that makes the water stewardship of the ORK possible is imbued with a political ecology that is not always characterized by harmony and carries different notions of collectivity.

June 27, 2016; Renfrew, Ontario

The Horton Boat Launch is located at a true, physical watercourse confluence, where the tributary Bonnechere River converges with the Ottawa River in Renfrew County. In June, I met Kathryn Lindsay there, an avian ecologist, adjunct research professor at Carleton University and leader of the Bonnechere River Watershed Project (BRWP). Lindsay grew up near the Bonnechere, was educated in biology at Carleton and went on pursue a career researching for the federal government. In 2007, while working

on state of environment reporting as a director of program management within Environment Canada under the Harper government, Lindsay and her unit were cut and transferred to the Wildlife service, another directorate of Environment Canada. Her career was interrupted and meaning was sapped from her work. However, her experience with watersheds gained from working in the United States inspired her and she ended up turning to the Renfrew County community to volunteer and contribute to protecting the integrity of the environment in new way by joining forces with the Bonnechere River Watershed project. She is also listed as a Riverwatcher on the ORK Riverwatcher map, but characterizes herself and the BRWP as having an arm's length relationship with the ORK and the Riverwatch program. The BRWP does not follow ORK Riverwatcher citizen science testing protocols and have different prerogative in how they attempt to inspire water stewardship in Renfrew County.

Meredith Brown, the ORK and the Riverwatcher program no doubt have had an overwhelmingly positive impact and presence through the watershed she notes, but Lindsay also has a different perspective than some about how they perpetuate collectivity. Lindsay sees the ORK as peers to organizations like the BRWP, which began in 1998 as a project of the Renfrew County Stewardship Council (Bonnechere River Watershed Project 2017). The ORK and the Riverwatchers are, in way, an inward-looking organization that is ultimately young and still in the process of building itself, says Lindsay. They enable the public to monitor and attend to the Ottawa River, but “they don't foster other organizations,” she tells me. There are basic levels of tension between the two groups caused by competition for the same funding, Lindsay says, but the

summertime announcement that the Ottawa River would receive heritage river designation by the federal government is an example of the ORKs lack of commitment to collectivity and formation of the confluences of stewardship capacity necessary to effectively encourage stewardship of the Ottawa River watershed. When the announcement was made, Lindsay says that Brown and the ORK received far too much credit. For 14 years, a group in Petawawa and Pembroke calling itself the Ottawa River Heritage Designation Committee worked diligently to lobby the government for the heritage designation, led by late MP Len Hopkins and enabled by their fundraising arm, the Ottawa River Canoe Brigade. Once the announcement was made, the group was livid, Lindsay said. They were not told, they were not invited and they got no credit. It was heartbreaking to them, she says.

Aside from these politics, there are some other, more pragmatic differences in their way of working that makes the ORK and the Riverwatchers a less relevant channel for water stewardship in Renfrew County, Lindsay says. People in the country are often weary of observe and report environmental monitoring and stewardship that potentially penalizes them and their way of engaging with the landscape. “We’re not trying to beat you over the head with a stick, we’re trying to get you involved with a carrot,” is the way that Lindsay puts it. Lindsay and the BRWP have instead applied for Trillium Foundation funding for the arts and environment that allows them to organize Paddle and Fiddle days wherein people set out together on the river to paddle and congregate for food, accompanied by musicians who play traditional Ottawa River valley fiddle music throughout the day. The BRWP has also helped to organize a play about the past, present

and future of the river called “Bonnechere River- Future Tense”, positive experiences that can draw people’s attention to issues. Rather than growing the membership and size of the BRWP or groups like the ORK, she is interested in action rather than succession planning or volunteer recruitment. In some ways, she feels like a failure because she has not grown the organization as the chair, but in many respects, that is also fine. Instead, through action, they try to get beach monitoring programs going with the Renfrew County and District Health Unit and foster collaborations and partnerships with other organizations like the Muskrat Watershed Council, a citizen group trying to address a crisis of algae growth in a regional lake.

We’re using a peer assist model. We’re helping other organizations either form or get stronger. We revised our strategic plan. The strategic direction is growing our collective capacity. It’s not about growing the BRWP, it’s about growing our relationships with other organizations so we’re stronger in our combined effort as a collective

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The map on the ORK website that illustrates their location and composition reveals only some dimensions of the ORK Riverwatcher collective. It illustrates the location of those Riverwatchers who wish their place in the watershed and email contact to be publicly known as well as a general geographic distribution of those who volunteer in the program. The map, however, does not show the total composition of the group and it does not make evident the many ways in which their stewardship is necessarily practiced or accomplished within their place of dwelling in the watershed. In contrast to

Meadows and St. Amour, who are among the more enduring core group who monitor the river, advocate locally and maintain relatively close ties to Murphy and the program, the membership and work of the Riverwatchers is also constituted by people like O'Malley and Lindsay who have core affiliations with other initiatives in tributaries to the Ottawa River that require unique practices of community activism and arts-based public engagement strategies to achieve their goals. Not dissimilar to the deployment of diverse practices like education, training for water testing and advocacy that Murphy and Riverwatchers like Simpson utilize, these differential confluences of water stewardship throughout the larger watershed compose a broader repertoire of approaches and solidarities necessary to intervene in the chronic and emerging threats affecting the watershed.

Rather than draw on theories of social movement and collective social action, I wish to continue to consider the collectivity of the Riverwatchers and the confluences of stewardship capacity they are composed of within the less explored avenues of anthropologist Kirsten Hastrup's work on the co-configuration of water and humanity. Scholars of Earth Stewardship, along with Hastrup, consider localized contemporary life and the challenges to the integrity of regional ecological systems in the Anthropocene relationally, as defined by local to global socio-ecological relations (Ogden, et.al. 2013: 342). While climate change was a persistent concern among many Riverwatchers I spoke with, large scale change was often superseded by their ability to act on the change manifesting locally on issues of energy development, in the case of the Mississippi Riverwatchers, or just in basic local engagement in watershed awareness through arts and

recreation, as was the case with Lindsay and the BRWP. The ORK Riverwatchers, while established for several years at this juncture, is still an emergent confluence of human imagination and interest in sustaining water (Hastrup 2014b: 21), a new sociality organizing collective responsibility (Hastrup 2009: 13) for watershed stewardship in the NCR. The ORK and the Riverwatcher program came to prominence during the administration of the Harper government, the budgets and policy of which directly debased environmental initiatives across Canada. Lindsay's criticisms of the ORK reflect the environment of survival, competition for scant resources and deficit of government support for regional ecology created by that administration. Lindsay's comments also present a diversity of perspective on how water stewardship should be led, organized and what kinds of collectivity are necessary to advance water security in the Ottawa River watershed today. The formation of the ORK Riverwatchers via multiple confluences of disparate groups and the friction of the political ecology between groups like the ORK and the BRWP are evidence of the search for mediation of watershed stress and action that must achieve more than just sustainability (Hastrup 2009: 24).

Returning to the notion of water as medium for generating theory (Helmreich 2011: 132), both Hastrup and anthropologist Stefan Helmreich reference sociologist Zygmunt Bauman, who employs the notion of the liquid to theorize about the transformative nature of modernity and our present moment of life on earth, particularly the pace and scale of social change (Hastrup 2014: 65; Helmreich 2011: 137). Bauman's conceptualization of the fluidity of contemporary society, I believe, finds relevance in considering the ORK Riverwatchers and the water stewardship of the Ottawa River

watershed as a whole. Water stewardship collectives like the ORK Riverwatchers, the Water Rangers and their affiliations with the myriad other groups doing water stewardship throughout the watershed like the BRWP have formed quite recently within regional history and, as I have documented, continue to reform themselves in response to a rapidly changing regional and global ecosystem that will only become more volatile if climate justice and movements towards Earth Stewardship are not advanced in critical mass across the world. This is happening against a backdrop of changing political administrations in Canada and the United States that have rapidly developed lopsided energy and environmental policies in ways that are having indeterminate, immediate and long-term effects. As I will describe in my final chapter, subverting large scale water insecurity within the Ottawa River watershed may well depend on the continued ability of disparate collectives to retain and enhance solidarity and join their respective organizational confluences of water stewardship-or organizational capacities for water stewardship-together.

2.7 The meaning of confluences and the collectivity of Ottawa River watershed stewardship

Throughout this chapter I have described the immense collectivity that constitutes the work of the ORK Riverwatchers and the confluences of people, institutions and the non-human elements that characterize their water stewardship. Unlike the larger ORK, the work of which is constituted by the deficits in water stewardship of regional governments as well as the political and financial currencies lent to the organization by

politicians and the public, the membership of the ORK Riverwatcher program is significantly constituted by the career experience of working in political bureaucracies held by many retired members. In addition to the largely rural lifestyles of many and their passion for environmental and community work, the experience of public service motivates many to continue to do work in line with their scientific practices or skills sets in retirement. For some Riverwatchers, adopting tandem roles in municipal government or close collaborations with government catalyze their work as water stewards, enabling them to create an impact that they otherwise would not be able to manifest in their roles as Riverwatchers. Beyond political bureaucracy, I have also described how the work of the ORK Riverwatchers is enabled by collaborative relationships with individuals and organizations engaged in stewarding tributaries of the river or recreation or sport. In these instances, a diversity of practices and actors allow both niche and common goals to be negotiated by the ORK and their partners. In some instances, such as collaborations with the Water Rangers and the Mississippi Riverwatchers, non-human technology or endangered insects are leveraged to accomplish the goal of diminishing human impact on the watershed.

I have also addressed the complexities of collectivity found in the confluences of water stewardship that form the ORK Riverwatchers. As Kathryn Lindsay of the BRWP related to me as we sat near the confluence of the Bonnechere and Ottawa Rivers, while the ORK manages a broad network of relationships with regional organizations, it is still a relatively young organization that she thinks has largely focused on its own organizational growth and building its public reputation. In her view, it has achieved

much of what it has - particularly the recent heritage river designation for the Ottawa River - at the cost of fostering trust and respect with other regional collectives. Lindsay advances the idea that the collective confluences of human interest and labour that enable the water stewardship of groups like the ORK and the Riverwatchers can be pushed further. Throughout my fieldwork, I witnessed and documented a plethora of ways in which the ORK and the Riverwatchers are continually helping tributary support groups like the Friends of Brewery Creek to complete E. coli testing and supporting collectives of homeschooling families and the Kitigan Zibi Cultural Camp with hydrology and watershed education to complement their broader goals in youth education. However, Lindsay, in sharing her perspectives on the peer assist approach of the BRWP as their strategic direction, is emphasizing the value of peer assistance and collective capacity building for the broader integrity of the entire watershed. In the next chapter, I will explore this idea further by examining the spectrum of water stewardship capacity that I incurred throughout the watershed during my fieldwork in the summer of 2016. My travels to visit ORK Riverwatchers and my experiences participating with other groups revealed to me that the Ottawa River watershed is stewarded in many ways that, while divergent in their practices and approach, perform significant functions of water stewardship that only strengthen the possibility of water security in the NCR.



Figure 9 Aquascope viewing of Lake Wanaki, Kitigan Zibi, July 26, 2016

3 Chapter: The collective capacity of Ottawa River watershed stewardship

After Murphy's hydrology lesson and further discussion of endangered species such as the American Eel concluded ("It lives in our watershed for 20-30 years...and connects us to the ocean!") everyone took part in a group water testing effort with Kavanagh. Now, the Cultural Campers explore Lake Wanaki anew, equipped with aquascopes, a bright orange pylon-shaped device fit with highly transparent Plexiglas at the wide end that allows students to peer into the ecology of the lake below the surface of the water. "They love the hands-on sciences," says Whiteduck. "This is the way science should be. Even the way the Cultural Camp is set up to be really hands-on...this is so much better than sitting with the textbooks. Its dry in that way, and it's hard to stimulate them. Kinesthetic learning. It's good!" For the rest of our time on the beach while the children take turns with the aquascopes and I explain the process of doing qualitative observations for water testing to one of the youth a short distance away, Cote's question breaks the murmur of conversation among the adults left on shore.

"You guys ever hear of anything called...like...a freshwater jellyfish?" asks Jan Cote, the gym teacher, one of two local teachers that invited Murphy, Kavanagh and I to Cultural Camp at Kitigan Zibi. "No!" replies Kavanagh enthusiastically to Cote, intrigued. "Someone got one at Abitibi Lake last summer. They got a picture of it. It's in another larger lake," confirms his wife Celine, the science teacher. "It's not far," confirms Jan. "Like, they're suspended in the water?" asks Murphy, incredulously, also

taken with his mention of the jellyfish. “They’re in the water,” confirms Celine, who goes on to note that her student not only took a video of the organism, but captured it and put it in an aquarium. “It’s a jellyfish?” asks Murphy again, to be sure. “It’s a jellyfish” Celine confirms. Kavanagh and Murphy vocalize their amazement with a chorus of “ooh” and “wow!” in harmony. Murphy asks if a photo of the organism exists. A young boy notes that footage of the jellyfish was put on Facebook some time ago. Whiteduck offers to contact her former student who shot the video to see if they still had the footage. Murphy acknowledges the remarkability of the find and suggests that in the future, they should contact her and the ORK with similar finds. “I looked it up. There’s such a thing as freshwater jellyfish,” Whiteduck says.

This brief dialogue between adults on the beach as the youth attending Cultural Camp played and peered below the surface of the water reveals the possibility of the new water stewardship discourse being developed during our visit to Kitigan Zibi. Neither Murphy, Kavanagh nor I were aware that a species of freshwater jellyfish known as *Craspedacusta sowerbii* had become recognized throughout Ontario lakes and parts of western Canadas as early as 2010, according to news media (CBC 2010). Considered symptomatic of climate change by some scientists (CBC 2012), it is a species that has been designated as invasive and is thought to have adapted to North American waters from boats and plants brought from China (Ballingal 2012). In this interaction between two Kitigan Zibi teachers, a wetlands biologist and a web designer - all of whom spend

time engaged in stewardship of different parts of the regional land and waterscapes - dialogue about emergent ecological change transcends the borders of everyone's self-defined knowledge (Haraway 1992: 90) and enhances the stewardship capacity of all present. From this point on, we will all be on the lookout for freshwater jellyfish in our travels throughout this watershed and take their presence as symptomatic of ecosystem change. This is a further instance of knowledge exchange between parties involved in the confluence of water stewardship capacity that converged on the beach at Kitigan Zibi that inverted the lens of science and TEK integration that this morning could be viewed with.

In contrast to Nadasdy's case study of the Kluane First Nation's inability to participate meaningfully in the conservation and management planning of government scientists, Cote and Whiteduck have necessarily blurred the "discreet bounded systems" (Nadasdy 2003: 133-134) structured by many projects seeking to integrate TEK into scientific studies. Murphy, Kavanagh and I were invited to Cultural Camp enable the water stewardship capacity of youth on their terms, on their land, in the context of Kitigan Zibi education. In the process, Murphy and Kavanagh's expertise is enriched by the Cote and Whiteduck's experience discovering new ecological phenomena in a landscape several hours and hundreds of kilometers north of Kitigan Zibi. After my experience within this unique emerging confluence of water stewardship capacity on Wanaki Beach, I began to understand that that the water stewardship practices of Kitigan Zibi are as unique, varied and informed by collectivity as those of the ORK and the Riverwatchers. Throughout the rest of my fieldwork, I was present during several moments to witness how the monitoring of foreign species as well as the youth education

and development of water monitoring skills development happening at Cultural Camp were only some of the ways in which Kitigan Zibi as a collective entity is active in stewarding the Ottawa River watershed in ways that others are not. Throughout this chapter, in contrast to the political constitution of the ORK Riverwatchers, I will detail how Kitigan Zibi leadership's negotiations with political bureaucracy and the political activism of its members constitute another emerging confluence of water stewardship that is managing risk facing regional water from fossil fuel energy infrastructure. This presents a confluence of water stewardship born from not only from human interest and imagination in survival (2014: 21) in Hastrup's terms, but also from a purposeful resistance to neocolonial development, perpetual alienation and a demand for reconciliation. I will also address how these practices are intertwined with the ORK and Riverwatchers, offering a pathway towards understanding how confluences of enhanced water stewardship capacity can form in the future.



Figure 10 STOP Oléoduc Outaouais! marchers crossing the Alexandra Bridge, August 20, 2016

3.1 Political water stewardship in Canada's National Capital Region

August 20th, 2016: Downtown Ottawa

Just over a half-hour late, slightly after three o'clock in the afternoon, the silence of the placid summer afternoon was broken as the marchers emerged onto the middle of the Alexandra Bridge that extends over the Ottawa River from Gatineau into Ottawa, or vice versa, depending on the direction of your travel. The beating of drums and fiddle songs played by a young man dressed in the garb of a government officer from a bygone era preceded the group, but soon the capitalist became visible. The activist group STOP Oléoduc Outaouais! (STOP Outaouais Oil Pipeline!) had been walking for six days along the Ottawa River from Saint-André d'Argenteuil, Quebec to the steps of parliament to demonstrate against the construction of the Energy East oil pipeline proposed by the TransCanada Corporation. In this final phase of their walk they advanced into the capital with mobile street theatre: two young men and a young woman covered in mud and dressed in leather straps and sandals as some sort of Roman slaves, pushing a brash comrade in a wheeled bathtub, himself dressed like a caricature of a late 19th century bourgeoisie aristocrat, bespectacled and complete with a three-piece suit and a top hat. Ottawa environmental organization Ecology Ottawa held a welcoming rally at Major's Hill Park that then proceeded to march with the group of 150-200 to the steps of parliament where so many demonstrations in Ottawa predictably end up taking place. Marchers shouted slogans like "Energy East is the plague!" while they passed people taking wedding photos and mentioned loudly to tourists as they progressed up Wellington

Street, “Watch out if you continue this way, you’ll start to look like them,” he says, pointing to the mud-caked slave actors pushing the tub. “Have a good holiday now!”

Once the marching collective arrived at the steps of parliament with leaders of Ecology Ottawa and the Public Service Alliance of Canada, introductions were made then Jean-Guy Whiteduck, chief of the Kitigan Zibi First Nation addressed the assembled crowd:

We as Aboriginal people have not been consulted by the government of Canada. We are concerned about the water. The water is sacred to us and we must take every effort to protect the water. We’ve seen the experience of Saskatchewan in the past few weeks, of water flowing through rivers and that could happen here too with this pipeline. This dirty oil will end up polluting our sacred water. It’s important that the government be made aware of this. This government talks about the environment on one hand, but caters to the multi-national oil companies on the other hand. I am proud to see you, of seeing people who have put in the effort. To show the Canadian public the possible problems of a pipeline spilling in our rivers and lakes. Water is sacred to us. And I would like to thank you for your effort, to make the Canadian people aware. I am convinced that if everyone puts in the effort, that this project can be stopped. It isn’t about convincing the majority of the population. It is really about convincing our political leaders. It is up to them to make the decision for us. Let’s hope that they make the right decision.

First proposed in 2013, the Energy East pipeline has been designed to convert an old natural gas pipeline running from Alberta to the Ontario-Quebec corridor into a 4600 kilometer line to an export terminal in New Brunswick, enabling a new capacity to carry 1.1 million barrels of crude oil daily (Bell 2016). Among many other watersheds across the country, the pipeline would cross a multitude of water courses throughout the Mississippi and Rideau River watersheds (Savaria Expert-Conseils Inc. 2016), eventually crossing the Ottawa River near Voyageur Provincial Park and the town of Pointe Fortune, Quebec (Council of Canadians 2017). A technical report completed by Montreal-based Savaria Expert-Conseils Inc. published by Ecology Ottawa and The Council of Canadians in October 2016 assessing the outcome of a possible hydrocarbon spill from the future pipeline found that in addition to compromising public drinking water intakes in Gatineau and Ottawa within 60 hours of spill into the Mississippi and Rideau Rivers - both of which it would cross - , a breach in the pipeline would irreversibly devastate wetlands, contaminate underground waters and compromise the regional tourist economy (Savaria Expert-Conseils Inc. 2016). These impacts could have drastic impacts on broader regional ecosystems, including the Gatineau River Watershed, which Kitigan Zibi First Nation is a part of as well as lands around Parliament which Kitigan Zibi has recently made claim to, as I will address below. On March 02, 2015, Kimberly Scott and Gilbert Whiteduck made applications for intervenor status on behalf of Kitigan Zibi in public hearings held by the National Energy Board (National Energy Board 2015a). Following

his election to office, Jean-Guy Whiteduck made an application to replace Gilbert in his status as intervenor on September 18, 2015 (National Energy Board 2015b). The pipeline has also seen public political resistance by Kitigan Zibi elders like Albert Dumont (Dumont 2017) Verna McGregor and Claudette Commanda at a town hall meeting held at the central branch of the Ottawa Library (Council of Canadians 2016a).

An emerging fossil fuel energy infrastructure development posing an extreme risk to the integrity of all life in the Ottawa River watershed, the Energy East pipeline is being strategically opposed with the political leadership of Chief Whiteduck and other members of the Kitigan Zibi First Nation in collaboration with regional allies and communities across Canada. In addition to STOP Oléoduc Outaouais! activists, Ecology Ottawa, The Council of Canadians and the Public Service Alliance of Canada - and even a coalition of brewers concerned about how a spill could compromise their industry (Sparks 2017) - Kitigan Zibi is joined in its resistance to the Energy East pipeline by the Tamiskaming, Wolf Lake and Eagle Village Algonquin First Nations of Quebec, and the Kanesatake First Nation (Tamskaming, Wolf Lake, Eagle Village First Nations 2015) as well as the entire Assembly of First Nations Quebec-Labrador. In the spring of 2016, weeks in advance of my fieldwork, word emerged that TransCanada had applied for permits to complete seismic testing on the St. Lawrence River and Ottawa Rivers to determine the feasibility of the pipeline crossing the river (Council of Canadians 2016c). Kanesatake Chief Serge Simon responded to the news with a bold statement against seismic testing for the pipeline and the ultimate construction of the pipeline, citing the direct threats that the pipeline would pose to water and non-human species (CBC 2016b). In a seven-page

letter to Quebec premier Phillippe Couillard authored by Chief Simon condemning the issuing of permits, Simon references the significance of the integrity of regional waters to the Kanesatake people eight times, at one point emphasizing specific localized concerns of a pipeline spill in the deep cold of regional winter weather. Referring to a previous report also prepared by Savaria Expert-Conseils Inc. for Montreal Metropolitan Communities, Simon notes:

The MMC report clearly demonstrates, therefore, just how risky the Pipeline would be, and that is without even addressing or even mentioning the extremely concerning possibility that an oil spill could occur in a watercourse in winter. We know it is impossible to clean up an oil spill in the water in winter. The MMC report does not even mention all of the major impacts that a spill would have on the Mohawk people, including our fishing, hunting, and gathering activities (Simon 2016).

Months later, on July 14, I received an email from the Ottawa Riverkeeper's Riverwatcher Googlegroup email listerv from founder, former executive director, now eponymous Ottawa Riverkeeper, Meredith Brown. In addition to friendly summer greeting, she asked any Riverwatchers in the vicinity of Voyageur Provincial Park and the town of Rigaud, Quebec to monitor for signs of TransCanada boats performing seismic testing on the Ottawa River on the Ontario side, as Quebec had refused to permit testing on their side of the Ottawa River, Brown wrote:

As you have likely heard, TransCanada has submitted their full proposal for the Energy East Pipeline Project to the National Energy

Board for review. Unfortunately, they have left out a very important piece - the engineering plans for how they will cross the Ottawa River with the pipeline (Email to author 2016).



Figure 11 Ottawa River at Voyageur Provincial Park, June 10, 2016

October 20, 2016: Ottawa Riverkeeper head office

When I initially met Meredith Brown, I remember that she was excited to talk about the new era of opportunity for Canadian water stewardship that had emerged as Justin Trudeau's Liberal government had taken power from the Harper administration after the Fall 2015 federal election. As we talk in October 2016, the ORK offices buzz with the life of the workday and I greet staff members as they walk by. The Riverwatchers "on the ground" did not end up relaying any information to Brown and the ORK on TransCanada's seismic testing back in July of 2016, but they were able to get some impressions of what was going on from someone in regional network of pipeline opponents in the area, Brown told me. In addition to the ORK accessing those local networks, Environmental Defense Canada also approached Brown about building "nodes" of pipeline opposition along the proposed path of the pipeline via the social network of ORK Riverwatchers. Brown approached some ORK Riverwatchers individually, and only saw a small draw of interest among a couple of people to become involved with Environmental Defense. It is real advocacy, "banging pots and pans" but that is not the kind of Riverwatcher that gets involved in the ORK network, Brown says. The Riverwatchers are good advocates and want to see protection, but they are not going to be organizing demonstrations, that is more of what Ecology Ottawa does, she tells me. However, it is important, she acknowledges. There is always room for everyone to do different kinds of stewardship work, says Brown.

What will become of the pipeline in the months and years to come and regional opposition to it? What direction will things take? I ask her. Brown responded:

The biggest powers to stop these pipelines, as we're seeing, is the Indigenous. I'm a bit pessimistic, seeing how the feds went forward on the Site C Dam and the LNG approval in B.C., that was a total disregard for Indigenous rights. They didn't want it. Near that crossing (where Energy East would cross the Ottawa River by Voyageur Provincial Park and Rigaud, Quebec) although our watershed is traditionally Anishinaabe, the Mohawk presence as you get down towards Lake of Two Mountains...that's where the Mohawks are and have been. They're up for a fight on it. We have some criteria we're insisting on. Even though, in our heart of hearts, we don't want the pipeline. We're not an organization that works on climate change, there's so many other organizations that are doing that. We're not going to get involved there. We're going to keep our piece on our expertise, which is the Ottawa River and the response...really focused on spills response. We know that what we're asking for, they're never really going to put on the table. So, we could never really support it. I don't know what's going to happen. The Indigenous voices against are going to be biggest and strongest against it.

Nevertheless, in addition to monitoring for seismic testing, the ORK have written official correspondence to the National Energy Board (NEB) advising them against their procedure for assessing TransCanada's application to proceed with the pipeline (National Energy Board 2015c). Similar to Chief Whiteduck's intervenor status, Brown and ORK policy advisor Stephanie Bolt have also applied to participate in NEB hearings in the

capacity of “commenter” with “relevant information or expertise” (National Energy Board 2015d). Among their concerns connected to the project, are “The potential environmental and socio-economic effects of the project, including the environmental effects of accidents or malfunctions that may occur in connection with the project, and any cumulative effects that are likely to result from the project, as considered under the Canadian Environmental Assessment Act, 2012” (National Energy Board 2015d). In this way, similar to the convergence of ORK and Kitigan Zibi water stewardship capacities that assembled on the beach at Lake Wanaki for the sake of education and experimentation, the mutual resistance of the ORK and Kitigan Zibi to the threat posed by Energy East comprises another emerging cultural confluence of political water stewardship capacity making efforts to prevent the risk of the pipeline to the Ottawa River watershed from coming into being.

Will there ultimately be critical mass against the pipeline that will ally with Indigenous resistance? Brown is not sure. Being in the capital and going to national events often, she notices that Quebec is often missing from the table on important issues. She feels like she is often reminding everyone that, “nobody is here from Quebec.” The ORK has made a point to work across provinces, but Brown says that it is rare to have all stakeholders present for significant moments of inter-governmental decision making regarding the Ottawa River. However, Brown thinks that perhaps more than Energy East, the issues surrounding the Chaudière Islands section of the Ottawa River could create a critical mass of stewardship around the Ottawa River in way that no other issue could. Since it was announced in 2013, the Zibi condominium development planned for a sacred

section of lands and river between Ottawa and Gatineau known as Asinabka to the Algonquin has been the centre of a regional political battle between developers, settler colonial governments, Algonquin First Nations of Quebec and Ontario as well as their allies. Resistance to the project has seen national support from the Assembly of First Nations as well (Barrera 2015). As I mentioned in chapter one, just before the 2016 Christmas holidays began, the Kitigan Zibi First Nation filed a groundbreaking land claim over Asinabka, the lands that that encompass Parliament Hill, and LeBreton Flats, where a hockey arena and billion-dollar condo-developments are slated to be built, among other municipal facilities (Barrera 2016). The dispute over the future of Asinabka and the Zibi condominium development “might have even more potential than the pipeline,” she says, in terms of rallying broad support across groups to mitigate impact upon the river. Building on the success of the Gatineau Declaration (Ottawa Riverkeeper 2017a) in bringing together First Nations, Métis, and multiple levels of government in Ontario and Quebec, Brown and the ORK hope later on this year to spearhead an Ottawa River Watershed Council (Ottawa Riverkeeper 2017h) which will build a different kind critical mass around the Ottawa River stewardship issues. The ORK hopes that the formation of a formal Watershed Council will transcend the “piecemeal legislation” that has governed the watershed to this point in time and create a new, multi-sectoral governance collective of “First Nations, municipal governments, provincial and federal agencies, nongovernment organizations, as well as representatives from business, industry, and tourism who are motivated by at least one common issue or interest to work together to protect and restore the Ottawa River through agreed actions” (Ottawa Riverkeeper 2017h).

As our conversation concludes, I ask Brown about the term, “waterworld”, which she has used throughout our discussion to describe the sphere of her work and life experience throughout our conversation.

For me, that’s all the people working to protect water or raise awareness of water issues. They range from people working for environmental organizations or communicators or people in the media world. It’s more of a network when I talk about it like that. I’m very networked with lots of people across Canada and beyond through my waterkeeper world...with people who have common goals and are fighting the fight and learning from each other and supporting each other. Just like the Riverwatchers need to have that kind of network, I need to have that network too.

3.2 Political activism as water stewardship in the Ottawa River watershed

The immense ecological risk to the Ottawa River watershed posed by the Energy East pipeline has fomented the coalescing of an evolving cultural confluence of water stewardship capacity. Characterized by the political activism and advocacy of the Kitigan Zibi First Nation elders, leaders, Indigenous and settler colonial allies as well as other aligned organizations, it is a different kind of water stewardship. It is a practice that is divergent from the urban water quality testing done by the City of Ottawa or regional conservation authorities like the Rideau Valley Conservation Authority or Mississippi Valley Conservation Authority or the place-based citizen science monitoring and education done by the ORK Riverwatchers. However, I argue that it is nonetheless a form of water stewardship, and an extremely valuable one. As I wrote in chapter one,

considering the practice of stewardship anthropologically today requires an expansive approach capable of recognizing diverse risk and commensurate capacity for human care across society (May 2015: 84). Anthropologist Krista Harper has written extensively of how political activists in Hungary have successfully protected the Danube River in the face of the “ecocolonialism” of the state and the unchecked “wild capitalism” of Eastern European industry (2005: 229). While Harper did not consider the work of activists in her study as water stewardship, they achieved the aims of basic stewardship and Earth Stewardship through their extensive work to challenge the structural environmental injustices perpetuated by capitalist economics (2005: 230). Demonstrations at Standing Rock have shown the world over the last year, multi-cultural convergences of public demonstration to protect water have the capacity to shape the trajectories of local social-ecological change (Ecological Society of America 2017).

Kitigan Zibi Chief Whiteduck recognized in his speech on parliament that the waters of the Ottawa River are at great risk of a spill if Energy East is constructed, waters that are sacred to the Kitigan Zibi First Nation and invaluable to all life along the proposed path of the pipeline. In addition to the Ottawa River, the pipeline poses a risk to a vast number of other watersheds and watercourses on its long path as well as Atlantic Ocean off the shores of New Brunswick where it would be refined and shipped from, not to mention water resources that are already being compromised in the refining of the oil in Alberta. As Chief Whiteduck told the crowd convened on Parliament in August, he was grateful for the efforts of demonstrators marching from Quebec who came “to show the Canadian public the possible problems of a pipeline spilling in our rivers and lakes.

Water is sacred to us. And I would like to thank you for your effort, to make the Canadian people aware. I am convinced that if everyone puts in the effort, that this project can be stopped,” he said. Chief Simon, in his letter to Quebec Premier Couillard invoked the possibility of public political demonstration against the Energy East pipeline and the seismic testing to determine its structural efficacy and invited the government of Quebec to align themselves with their opposition:

While we feel it is our obligation to do so, we do not consider that we are in any way standing in the way of progress. We consider that it is rather the pipeline which is standing in the way of progress. We encourage the government of Quebec, therefore, just like we encouraged the Montreal Metropolitan Community during its public hearings on the Pipeline, to join us in the fight against this dangerous project. Such collaboration would demonstrate that meaningful reconciliation between indigenous and non-indigenous peoples involves building a better future together (Simon 2016).

Public demonstration, political activism and advocacy have the power to mitigate or prevent the risk of the pipeline to the watershed from even coming into being, according to Whiteduck, and to redefine social progress via activism, in Simon’s perspective. As Prime Minister Justin Trudeau acknowledged of Energy East while campaigning for office in 2015, “We need to get our resources to market and more oil by rail is a bad idea. We need to do it in a responsible way and that means pipelines. But those pipelines have to achieve the public trust and the social license that is necessary” (Steeves 2015). The mandate for this sort of social licence is a similar shaping of a

trajectories of social-ecological change at a local scale - with global impact - that the movement surrounding Standing Rock in North Dakota had achieved in the final days of the Obama administration prior to the policy change of the Trump administration. As I have noted in chapter one, proponents of Earth Stewardship recognize, “life as a process that unfolds through changing assemblages of humans, other species, technologies and institutions” (Ogden, et.al. 2013: 341). In addition to long-term chronic risk to the Ottawa River watershed like storm water management and invasive species, the kinds of large scale risk to contemporary, processual life in the Ottawa River watershed posed by fossil fuel energy infrastructure like the Energy East pipeline therefore require an assemblage of stewardship practices, including water stewardship through direct political activism such as the march and speeches I observed in August that are capable maintaining public awareness and delaying or even stopping risk posed by the pipeline from manifesting.

Expanding our understanding of what **legitimate** water stewardship is and can be to the realm of the political could enfranchise the broader Canadian public to challenge the wild capitalism and ecocolonialism (Harper 2011) of the Canadian oil industry in the future. During the 2017 election season in British Columbia, the Dogwood initiative is spearheading public engagement in coastline stewardship via campaigns against provincial Liberal government support for the Kinder Morgan pipeline’s threat to the waters of the Pacific Ocean off the B.C. coast (Dogwood.ca). As Brown indicated in our interview, no matter what conditions are placed upon its approval, the major risk posed to public drinking water intakes and wetlands posed by a potential Energy East pipeline spill, as outlined in the October 2016 report by Savaria Expert-Conseils Inc. is also

indefensible for the ORK, just as it is for First Nations like the Kanasatake Mohawks. The participation of the ORK and Kitigan Zibi First Nation in NEB hearings on the Energy East pipeline raises again the question of the environmentality (Cepek 2011) of the current systems of political water stewardship in Canada. Perhaps, as Nadasdy considered in his study of Kluane negotiations for their land against the Canadian state, the power of the federal government and the bureaucratic supremacy of the NEB as a Euro-Canadian political institution (2003: 248) that all parties must exercise their dissent within negates the efficacy of First Nations-led political water stewardship. However, I believe that this is not the case. The public positions and actions of Simon, Whiteduck and their allies beyond the NEB hearings articulate a kind of water stewardship via political activism which could be capable revoking any social licence for the project bestowed by the NEB. Furthermore, the array of water stewardship practices (including citizen science water monitoring, Cultural Camp and allied political activism) being cultivated by the larger Kitigan Zibi First Nation which I have described throughout these chapters represents a unique contemporary water stewardship capacity being assembled to address the emerging and perceived future needs of Kitigan Zibi in their existence on their land (Cruikshank 2006: 365). This capacity may generate new forms of political water stewardship parallel to the critical mass that converged around Standing Rock in the United States or, perhaps more likely, a social formation that is unique to the confluences of First Nations and settler colonial allies of the NCR and Canada.

3.3 “This watery world”: Making sense of confluences of water stewardship emerging from the Ottawa River watershed

Throughout this thesis, I have described the many ways in which water stewardship is being accomplished collectively in the Ottawa River watershed today. My initial motivations were to understand who in Canada's NCR is attending directly to the Ottawa River, the source of water for all life and human residents, aesthetic prestige for the political capital, industrial sustenance and recreational mediation for local and tourists alike. Specifically, I was interested in how new forms of water stewardship were manifesting in a new era of Canadian water insecurity (Barlow 2016: XV). My travels throughout the watershed and beyond with the ORK allowed me to participate in initiatives that were emerging to manage present and future risk to the integrity of the Ottawa River watershed. It soon became clear to me that the omnipresent quote of anthropologist Margaret Mead included on the second last page of the ORK Riverwatcher Handbook ("Never doubt that a small group of thoughtful, committed citizens can change the world; indeed it is the only thing that ever has (Margaret Mead in Ottawa Riverkeeper 2015)") was an over-simplified sociocultural literary symbol to decorate the work of the ORK Riverwatchers with, especially during the time I spent with them in the summer of 2016.

As Brown indicated to me, the work of the ORK and the Riverwatchers is constituted by a broad network, one that I found was composed in turns of people, technology and even non-human species. These are shifting assemblages of capacities to address diverse threats to the watershed some scholars from different disciplines term Earth Stewardship, the "shaping trajectories of social-ecological change at local-to-global scales to enhance ecosystem resilience and human well-being" (Ecological Society of

America 2017). Proponents of Earth Stewardship reject simple notions of stewardship that focus on management of resources for present and current use, instead taking our existence in the human-formed Anthropocene to be foundational and recognize “life as a process that unfolds through changing assemblages of humans, other species, technologies and institutions” (Ogden, et.al. 2013: 341). Located in the Anthropocene and the effect of climate change on world water resources, the work of anthropologist Kirsten Hastrup aligns with the ideas of Earth Stewardship. Hastrup recognizes the environment of ecological precarity permeating the global and local requires new socialites and collective responsibilities to effectively ensure social and ecological resilience (2009: 13). In localities, where human societies influence the hydrological cycle as they understand it in particular ways in order to ensure the survival of their communities, Hastrup writes, we therefore must consider how water is in “confluence” with human imagination and interest (2014: 21). Throughout my writing here, I have considered how the notion of the confluence (“a meeting point of two or more rivers...where a tributary joins a major river, called the mainstream” (Chaudhary 2014)) describes the convergences of collective water stewardship capacity that I have participated in to support the integrity of the Ottawa River and the larger watershed.

As I noted in the first chapter, the concept of the confluence as Hastrup articulates it and as I employ it is not metaphorical purely, but instead references the deliberate ways that people influence the hydrological cycle “as they perceive it, for their community to thrive” (Hastrup 2014: 23). Throughout my fieldwork, I have observed two general manifestations of this in practices and sociocultural formations. I have witnessed

repeatedly how organizations, people and technology physically immerse themselves in confluence with water to create or influence the direction of watershed stewardship through such practices as citizen science water monitoring microplastics testing or even swimming as demonstration. I have also witnessed the meeting of people with different forms of knowledge living in different parts of the watershed converge together along watercourses to strategically to enhance or create new stewardship capacities, exemplified in the ORK Riverwatchers relationships with groups like Kitigan Zibi, the Mississippi Riverwatchers or the Bonnechere River Watershed Project. These confluences of practices with water and sociocultural formations with one another are not mutually exclusive, however, and are often shifting, simultaneous and co-constituent.

In chapter one, I described how the convergence of ORK Riverwatchers (via Murphy) and Water Ranger (via Kavanagh) capacities with the land-based teachings of elders at the Kitigan Zibi First Nation summer Cultural Camp for youth represented a unique emerging confluence of water stewardship capacity on the beach of Lake Wanaki in the Gatineau River watershed, which is part of the larger Ottawa River watershed. Shifting between education on shore and experimenting with citizen science sampling and water monitoring tools in the water, this meeting of groups with vested interest in stewarding the Gatineau and Ottawa River watersheds was organized by the Kitigan Zibi teachers in order to diversify the awareness of water systems among the youth present and enhance their capacity for future stewardship. The incorporation of hydrology and citizen science into Cultural Camp that morning inverted the stereotypical lens with which the fusion of science and TEK could be viewed. Instead, unilateral, “discreet

bounded systems” of experience and knowledge (Nadasdy 2003: 133-134) were blurred in order to create new confluences of water stewardship in which nobody present was learning practices for the purpose of playing by “the rules of the game” in a Bourdeausian sense (Nadasdy 2003: 5). My participation and observations this morning provided a clear example of the ways that people innovate and purposefully seek to influence hydrological cycle “as they perceive it, for their community to thrive” (Hastrup 2014: 23).

In chapter two, I detailed my central ethnographic work with the ORK Riverwatchers, the group of volunteer citizen water stewards that Murphy manages and Kavanagh worked with primarily in the first year of her web app being operational. Largely retired and living on the shores of the Ottawa River throughout the watershed in Ontario and Quebec, my time with the Riverwatchers revealed that the group is an extremely complex, ever changing confluence of stewardship capacity constituted by many sociocultural dimensions particular to the NCR. Rather than simply watching or observing the state of the river, the Riverwatchers sample water and observe their sections of the Ottawa River in diverse ways that are configured by their own place based dwelling knowledge (Basso 1996: 54) and as well as the shifting enumerative (Muehlmann 2012: 349) needs of the ORK and their partners, evidenced by our brief visit to St. Amour and Meadows in Westmeath. The development of both qualitative and quantitative data is being enabled by Kavanagh’s Water Rangers web app, which is, in effect, standing in (Latour 1999: 189) for Murphy’s data entry labour and enabling a new era of collectivity (Latour 1999: 193) among ORK Riverwatchers and others. Throughout

my research, I also learned that the work of the ORK and the Riverwatchers is uniquely constituted by the multiple political jurisdictions and bureaucracies that exist in the NCR. In particular, the passionate work of many Riverwatchers is informed by their careers within federal government agencies or ministries. Others work closely with municipal governments or even hold office simultaneously to further their aims in rural areas, enabling environmental subjectivities that are less Foucauldian in their orientation (Agrawal in Cepek 2011: 503) but more significant to the way that the political and nature are co-produced within the political and cultural ecologies of the NCR (Smith 1984: 48). However, beyond just political bureaucracy, the membership Riverwatcher collective is constituted by an extensive network of individuals with concurrent alliances to other river watching groups supporting tributaries to the Ottawa River as well as recreational rafting or fishing groups with persistent presence on the River. These groups, while allies of the ORK Riverwatchers, have unique local concerns in their watersheds and sometimes perceive the function network collectivity differently than the ORK. The ORK Riverwatchers, is a relatively young organization that is ultimately fluid itself (Bauman in Helmreich 2011: 137), as it utilizes the location, experience and skills of its network to respond to changes in the socio-ecological dynamics of the Ottawa River watershed from year to year (Bauman in Hastrup 2014: 65). As of this writing, the ORK recently received \$292,900 in funding from the Trillium Foundation for the Riverwatcher program that will enable it to expand and shift its form again over the course of the next three years (Email to author 2017).

Finally, throughout chapter three, I have shown how beyond Cultural Camp and experiments in incorporating hydrology knowledge and citizen science techniques, Kitigan Zibi water stewardship includes an array of practices, including observation for emerging invasive species such as the freshwater jellyfish found by Cote and Whiteduck at Abitibi Lake and the political leadership of Chief Jean-Guy Whiteduck in resisting emerging threats to their traditional land in the Ottawa River watershed and the Gatineau River watershed posed by industrial development. Chief Whiteduck's public resistance to the ecological threat posed by TransCanada Energy East pipeline exists within a broad network of resistance to the fossil fuel infrastructure project, including other powerful regional First Nations, regional associations of First Nations, settler colonial allies and environmental organizations. This network also includes the ORK Riverwatchers, who, in their widespread monitoring capacity, were called upon by Brown to observe for any signs of TransCanada boats active in completing seismic testing on the Ontario side of the River. The ORK have also sent public correspondence criticizing the Energy East pipeline and applied to officially participate in NEB hearings on the project. Similar to the convergence of capacity on the beach at Lake Wanaki, resistance to Energy East represents a confluence of water stewardship. However, it is one accomplished politically in response to the emerging dynamics of ecological threat assembling in the watershed via wild capitalism and ecocolonialism (Harper 2011). These are the kinds of networks that are coming to define the larger decisions about protecting the Ottawa River watershed from major risk in the future. They are defining what kind of "waterworld" the Ottawa River watershed is; what kind of network of water centric connections mediates

people's relationships with water in the NCR, as Brown put it. This is the question I would like to end on. What kind of waterworld is the Ottawa River watershed?

As I have written throughout this work, the concept of the confluence enables us to see how water stewardship in the Ottawa River watershed is accomplished - much like the meeting of two rivers - by direct human intervention with the river and the meeting of collective forces of water stewardship to alter the spectrum of human intervention or use in response to threats. This concept is part of anthropologist Kirsten Hastrup's larger concept of the "waterworld" which encompasses, "the power of water to make and unmake social worlds" (2016: 03) and the simultaneous response of people as they "fashion their life according to their understanding of water's course and force" (2014: 03). Her colleagues have also more determinately phrased it as "the totality of connections that water may have in a given society" (Orlove and Caton 2010: 403). This phrasing and its underscoring of the sociocultural significance of connections helps to frame some of my final conclusions. My ethnographic research, focused on the connections between people in their ultimate goals of stewarding water, made the significance of human relationships to water stewardship in the NCR clear. This focus illuminated the role of the larger collectivities people belong to - such as political bureaucracies, localized watershed initiatives and activist movements - in constituting how water stewardship is practiced, especially as new risk propelled by national fossil fuel energy infrastructure emerges. However, these dimensions could define many other watersheds as discreet waterworlds in Canada, especially those along the path of Energy East. What is particular to the NCR as the political capital of Canada? What do the

confluences of water stewardship I have described compose together, in correspondence with the water they protect?

My research found that the Ottawa River watershed is a waterworld that is constituted by Canadian colonial history, industry and disenfranchisement of First Nations from their traditional lands. As I learned in my travels, the tannins from errant logs lost to the bottom of the riverbed still colour the water and disempowerment of First Nations still characterizes decisions being made that will impact the future of the river. I also found that it is a waterworld defined by the National Capital Region and the existence of multiple political bureaucracies and their ability or inability to coordinate long-term plans for managing the river in the nation's capital. Therefore, the passion, expertise and resources of people like the ORK Riverwatchers fill significant gaps in how water is monitored throughout the watershed, how it is advocated for and how it is ultimately protected. However, the massive scope of the Ottawa River, and the number of lives it impacts mean that it is essential for groups like the Riverwatchers to coordinate their efforts with the Ottawa River watershed's sub watersheds and tributaries to be responsive and work together to make decisions that will ensure the integrity of the watershed is maintained in the face of a growing assemblage of threats that could compromise its integrity. It is a waterworld that is also not defined purely by these human dimensions.

The Ottawa River watershed is also uniquely defined by the way it is shaped by its collective relations with technology. As I have noted throughout, I have witnessed the

present and future of Ottawa River watershed stewardship being shaped with technology. The tools people employ to accomplish stewardship are part of the network of connections, the collectivity (Latour 1999: 193) that must be called on to address emerging ecological issues in the Anthropocene. It would be easy to dismiss the Enviroscape model that Murphy used to demonstrate hydrology to Cultural Camp youth (as well as the public) or Kavanagh's Water Rangers web app as secondary to human intervention, but these technologies enable Murphy and Kavanagh to convey knowledge about watersheds - and the Ottawa River watershed in particular - through representations that utilize the capacities of human imagination and interest (Hastrup 2014: 21) that are instrumental in transforming our relationship with water. Kavanagh's web app, which was inspired by her father's desire to learn more about the water quality of the lake their family home is situated on in the nearby Val-des-Monts lake district, is enhancing not only the kinds of textual and visual information that can be captured in the Ottawa River watershed, but its open data format is also enabling Riverwatchers and others to identify trends gleaned from sampling over time in ways that were the providence of individual organizations like the ORK or the government before. Funded by the government of Ontario's Trillium Foundation and fostered by support from organizations across the region, the design of Kavanagh's work is of the NCR landscape and changing the way that water stewardship is done in the NCR.

Further beyond the realm of the human, it should be acknowledged that non-human species of the watershed ecologies also characterize the unique water world that is the Ottawa River watershed and were instrumental in water stewardship strategies

throughout my fieldwork. The Water Rangers web app makes it extremely easy for people to capture images and monitor the growing populations of invasive species like Zebra Mussels and Eurasian Water Milfoil that are considered threats to native species. Furthermore, groups like the ORK Riverwatchers and the Mississippi Riverwatchers work strategically on behalf of dwindling species that cannot speak for themselves like the Rapids Clubtail Dragonfly or the American Eel. Their vulnerability are frequently referenced to dissuade development or mitigate impacts that can compromise the integrity of the watershed at large, slowing decision making and complicating the question of what is being done for the good of which life (Stengers 2005: 1002-1003). As reports of the freshwater jellyfish by Cote and Whiteduck illustrate, the decline or appearance of new species not previously known to exist in the ecosystem can suddenly shift the ways in which a watershed is conceived of or known. The efficacy of these species and others-as well as the water they depend on- then is another non-human dimension that defines the waterworld that it is the Ottawa River watershed and the stewardship of it. Rather than superfluous to my central task of examining the constitution of Ottawa River watershed stewardship via the ORK Riverwatchers, recognizing the role of other species is part of the most basic definitions of stewardship (Worrell and Appleby 2000: 275). All life, not just human life, is dependent on the vitality of watersheds. Therefore, my ethnography of water stewardship has been necessarily strengthened here when it has expanded beyond the cultural in moments to an ethnography of life (Kohn 2007: 6) in the Ottawa River watershed, taking into account the larger series of processes and relationships (Kohn 2007: 6) that define the watershed.

Within Hastrup's notion of the waterworld, human beings are perpetually ensuring the survival of their communities by imagining and configuring new relationships with water, creating new confluences of possibility (2014: 21) that compose their waterworld. Hastrup's ideas are reminiscent of the term "meshwork" coined by Anthropologist Tim Ingold to describe the totality of connections between all constituent components of the environment and their continuous trajectories of becoming (2008: 11). Rather than a network of actants, as Bruno Latour's notion of collectivity describes, Ingold's notion of meshwork emphasizes the fluid character of life, "wherein boundaries are sustained only thanks to the flow of materials across them" (Ingold 2008: 11-12). If the notion of Hastrup's waterworld and the confluences it is composed of is expressed through Ingold's idea of the meshwork, the idea that what we as human beings and the world we live in are collectively becoming is bound in a continuous trajectory with water, and, therefore, that which threatens the integrity of water. The Energy East pipeline currently only partially exists. It is manifest in the form of a root existing natural gas pipeline stretching from Alberta to Quebec that will be converted into part of the oil pipeline (Bell 2016), but it also has an emerging existence in maps, news stories, government documents and webpages extolling arguments for and against it. However, it is a technology - while created by human beings - is non-human and may determine how the Ottawa River watershed is stewarded on a larger scale in the months and years to come. Interim Conservative Party leader Rona Ambrose recently stated publicly that she does not think that the pipeline will ultimately be built (Scotti 2017), however, the ways in which its manifestation is negotiated by the powers of proponents and opponents will reveal the strength of water stewardship - particularly political water stewardship -

building in confluence with Kitigan Zibi, the ORK and others in the waterworld of the Ottawa River watershed.



Figure 12 Empty cup on Britannia Beach, Ottawa, July 31, 2016

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