Situating corporations in natural resource management:
a corporate power map of Treaty 8 territory in northeastern British Columbia.

By

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July, 2018

A thesis submitted to McGill University in partial fulfillment of the requirements of the degree of Master of Science in Renewable Resources.

Table of Contents

List of Figures and Tables

Abstract:

Globally we are facing numerous ecological crises (Steffen et al., 2015; Turner, 2014). These crises are predicated on and exacerbated by economic, legal, and ethical approaches to the environment that are not equipped to address systemic environmental issues (Brown & Garver, 2009; Pelletier, 2010). These environmental issues result from a system that also colonizes and oppresses Indigenous people (Coburn & Atleo, 2016). Both the social justice crises of colonialism and our collective ecological crises have solutions arising from outside of western capitalist society. This paper builds on the proposition that empowering Indigenous actors can lead to radically different human to human and earth to human relationships (Escobar, 2007; Mignolo, 2007). The author worked with Indigenous actors from Treaty 8 territory in Northeastern British Columbia (BC) to establish research objectives supporting their work.

A corporate power map of Treaty 8 territory outlines the environmental impacts of resource extraction and helps to identify, characterize, and challenge the corporate network driving extraction. Corporate power mapping combines GIS, Social Network Analysis (SNA), financial analysis, and qualitative observations to critically assess extractive networks. 33 companies were chosen as the center of this study, including 20 companies driving oil and gas exploitation in BC and 13 companies proposing multi-million-dollar investments in the Treaty 8 region. A SNA of affiliated oil and gas companies provides important reflections on the integration of resource extraction companies across Canada, while ownership networks are used to draw parallels between capital extraction and historical sources of colonial power. In closing some applications of corporate power mapping to challenge resource extraction on Treaty 8 territory are explored, including identification of key companies driving and profiting from extractivism.

Résumé

Globalement nous faisons face à de nombreuses crises écologiques (Steffen et al., 2015; Turner, 2014). Ces multiples crises ont racines dans nos systèmes d'économie, de gouvernance, et d'éthique; des systèmes de pensée qui eux-mêmes ne sont pas équipés pour adresser des problèmes systémiques comme le changement climatique (Brown et Garver, 2009; Pelletier, 2010). Les mêmes systèmes responsables pour nos problèmes environnementaux sont aussi complices dans la colonisation des peuples autochtones (Coburn et Alteo, 2016). Des solutions à la crise de justice sociale causée par le colonialisme et les crises écologiques se présentent à la marge de notre société. La base de cet article propose qu'en promouvant les droits des autochtones nous pouvons promouvoir une relation plus saine entre humains et avec la planète (Escobar, 2007; Mignolo, 2007). L'auteur a travaillé de près avec des autochtones des territoires du Traité numéro 8 au nord-est de la Colombie Britannique pour établir des objectifs de recherche qui contribueraient à leur lutte pour une justice environnementale.

Ce travail présente les résultats d'une carte de pouvoir et d'une recherche sur la structure du pouvoir des compagnies d'extraction de ressources naturelles au nord-est de la Colombie Britannique. Les résultats de la recherche peuvent aider à identifier, caractériser, et faire face au réseau de compagnies extractrices sur le territoire. Les outils de recherche comptent l'utilisation du Système d'Information Geographique (SIG), de la méthodologie d'Analyse de Réseaux Sociaux, d'analyses fiscales, et de la collecte de données qualitatives sur les compagnies extractrices au cœur de ce projet. Trente-trois compagnies ont créé la base des réseaux extracteurs inclus dans cette étude, incluant vingt compagnies d'énergie fossile et treize compagnies qui proposent des projets d'une valeur de plus de 15 millions de dollars. Une analyse de réseau social pour les compagnies d'énergie fossile offre d'importantes réflexions sur l'intégration de l'industrie extractive au Canada. Une deuxième analyse, axée sur les réseaux de propriétés, démontre un lien étroit entre les anciens pouvoirs coloniaux et la distribution moderne des profits de l'extraction. En conclusion plusieurs applications de cette recherche pour confronter les compagnies extractrices sont explorées, incluant l'identification de compagnies clés pour l'extraction des énergies fossile sur les territoires du Traité numéro 8.

Acknowledgements:

I would like to begin by thanking Dr. Peter G. Brown, whose vision drew me back to academia and whose guidance and support helped me pursue this inspiring and meaningful research topic. I also owe a tremendous debt of gratitude to Dr. Jean Philippe Sapinski for joining my committee, providing regular feedback on my methods and data, and introducing me to the methods of Social Network Analysis. I would also like to recognize the Corporate Mapping Project, a joint initiative by the University of Victoria and Canadian Center for Policy Alternatives BC Chapter, for sharing some of their data, and everyone involved in that herculean task of tracking the influence of the fossil fuel industry in Canada.

Creating a corporate power map of Treaty 8 territory has been quite the journey and I would like to thank Caleb Behn and Dr. Karen Bakker who launched me down the road of inquiry through corporate mapping. I hope they will find the results useful and instructive.

Many thanks to my fellow E4A students, especially Chris Orr and Aurelie-Zia Gakwaya who have consistently helped me review ideas and mark my progress. Lastly but not least, special thanks to Gillian Nicol, Eric Hartley and Johanne Dufour for their constant support throughout my thesis process.

This research was partially supported by departmental grants from the Department of Natural Resource Sciences at McGill University.

Authors Contribution to this research project:

Unless otherwise noted all research and content in this thesis is the original product of the author. Significant support for social network analysis came from Jean Philippe Sapinski while the inter-corporate network data came from the Corporate Mapping Project.

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1. Introduction

It is 2015. I have just finished reading "This Changes Everything" by Naomi Klein. Fired up about the environmental challenges facing us I reflected on how I perceive addressing them. At the time I was a campaigner with a small place-based NGO called Friends of Clayoquot Sound. Through my work I was privileged to work with the Tla-o-qui-aht First Nations, one of three Nuu-chah-nulth nations whose traditional territory covers Clayoquot sound. I had also previously studied natural resource management on Haida Gwaii. The message from both experiences was clear, there is no solution to environmental challenges in Canada without justice for and leadership from North America's Indigenous people.

Wanting to better understand the systemic nature of the environmental challenges we face I returned to school to pursue a master's degree in Ecological Economics in fall 2015. During my research I was fortunate to come across the concept of Service Research (Trauger & Fluri, 2014). The base premise of service research is to support a community or group that the researcher has an attachment or link to. I wanted my research to contribute to an understanding of natural gas extraction in my home province of British Columbia. Embracing the concept of service research I was able to link up with Caleb Behn and to offer my academic tools to him and Keepers of the Water, a regional NGO. Working together we identified some useful research outputs that rapidly became the focus of my thesis. By using power structure research and power mapping methods, I outline the environmental impacts of resource extraction and data on corporations to help identify, characterize, and challenge the corporate network driving extraction.

To open this thesis, I start by situating this research in the twin challenges of ecological collapse and colonialism, offering some arguments for cooperation and allyship with Indigenous groups. Next, I introduce my research question and dive into the context of extraction on Treaty 8 territory. Then I outline my methods, drawing on power structure research and power mapping methodologies, including social network analysis. Later, I review the results of ownership and inter-corporate network analyses and discuss my findings in the context of each extractive company. Special attention is given to characterizing the corporate extractive network operating on the BC portion of Treaty 8 territory. I close by summarizing my findings, the implications of

this research, and outlining some future directions for a corporate power map of Treaty 8 territory.

Environmental Crises, Colonialism, and Indigenous Solidarity

This research is situated at the intersection of environmental crises, colonialism, and Indigenous resurgence. Environmental conflicts and colonialism are seen as outcomes of the western worldview. The term western worldview is used here to refer to the ideological norms and economic processes that justify and inform the dominant forms of national governance, economics, and ethics. Western worldview is used because it compliments Indigenous critiques of colonization. Specifically, for many Indigenous scholars, colonization entails not only a re-configuration of Indigenous economic relations, but also caries strong ideological consequences including the systematic questioning and destruction of traditional knowledge and stories. This research tries to challenge the western worldview by empowering Indigenous Knowledge while providing tools for undermining colonial-capitalist relations to the land. Ultimately this research narrows in on corporations as specific vehicles for global capitalism, and important actors in producing and imposing the western worldview.

I first establish the environmental crisis as embedded in a set of practices and configurations of power specific to the western worldview. Next, I draw links between the western worldview and colonialism, reviewing the argument that the systemic destruction of our environment and the colonization of Indigenous people go hand in hand. Lastly, I review the arguments of Indigenous scholars proposing that solutions to these challenges already exist in Indigenous Knowledge. These sections will lead into a discussion of the research question driving this thesis.

Situating Environmental Crises

> *"The proliferation of attempts to manage environmental resources and impacts while simultaneously we witness an accelerating human impact on the biosphere and consumption of earth's resources suggests that we are in need of re-evaluating the norms that underpin industrial society."* – Nathan Pelletier, 2010a

The news-article headline “Five Hottest Years on Record: all since 2011” is a stark reminder of the realities of climate change (McGarth, 2016). Headlines such as “Canada: largest contributor to deforestation worldwide” remind us that everywhere ecosystems are being converted into industrial inputs (Huffington Post, 2014). The seminal “limits to growth” paper by the Club of Rome during the 1970’s predicted that by the 2030’s resource use, population levels, and environmental pollutants would be reaching critical thresholds (Meadows et al., 1972). Their predictions were derided by critics, but studies have since compared their projections with environmental trends since the 1970’s and found the limits to growth paper to be frighteningly accurate (Turner, 2014; Turner, 2008). Adding to this urgency the updated 2015 planetary boundaries report revealed ecological overshoot in key components of the global ecosystem such as the carbon cycle, nitrogen cycle, and fresh-water cycle. The planetary boundaries report tracks thresholds critical to a stable human environment (Steffen et al., 2015). It is evident that though knowledge of our environmental predicament is established and compelling, actions by national governments, private corporations, and even the United Nations have failed to shift global trends away from environmental crises.

The environmental crises we are facing are perpetuated and exacerbated by the social organization and ideological norms inherent in the dominant economic, ethical, legal, and governance approaches for managing the human-earth relationship (Brown & Garver, 2009; Merchant, 2013; Pelletier, 2010a; White Jr., 1973). For example, relationships with the earth are organized through our economic system. The economic system of global capitalism is one predicated on endless economic growth, growth that is dependent on increasing material throughput (Victor & Rosenbluth, 2007). Increased material flow through the economy means a larger extractive footprint and more waste dumped back into the environment. Attempts to regulate the environment through an economic system that focuses on increasing material flows are at odds with the hard limits on human consumption and waste creation inherent to the tipping points of planetary cycles (Daly, 1992).

Current legal and governance structures in place through constitutional democracies and the United Nations also reinforce the structures responsible for the environmental crises. Western governance structures are predicated on absolute sovereignty, and a possessive

relationship with the earth (Atleo, 2011; Mansfield, 2007). The relationship fostered is one that treats nature expediently, prioritizing resource extraction and monetization. This relationship has thus far proven incapable of sufficient precautionary measures to avoid repeated environmental consequences or collapse (Daly, 1982). Indeed, top down measures to protect the environment, as well as ideological measures such as privatization, frequently fail to provide optimal environmental protection outcomes (Ostrom et al., 2007).

Even the ethical system underpinning contemporary legal and economic thinking further inhibits strong environmental decision-making. Ethics such as utilitarianism have been incorporated into decision making in a way that prioritizes the immediate material wellbeing of the individual, inherently placing environmental concerns and reasoning as secondary in the decision-making process (Pelletier, 2010b). The primacy of individual human wellbeing in ethics reflects underlying assumptions about human independence from nature and the isolation of individual actions from broad scale environmental consequences (Schmidt et al., 2016). Western ethical systems are unprepared to inform appropriate decisions on behalf of an earth-community (Schmidt et al., 2016).

The current tool kit of western thinkers for addressing environmental concerns is rooted in approaches to economics, ethics, law and governance that further environmental crises. We can lump these problematic ideological norms and economic relationships into a single "western worldview", to emphasize their concurrent implementation and complicity. The next section reflects on the imposition of this western worldview over other worldviews that could inform earth-human relations.

Western Worldview and Colonialism

The same economic relations, ethical systems, and approaches to law and governance that further environmental degradation and overexploitation are also key drivers of colonialism. Here colonialism is used as a framework for understanding the historic and ongoing relationship between Indigenous people and Europeans. Colonialism evolved through the policies and institutions established by European and post-European governments (i.e. Canada) to govern the relationship between the state and Indigenous peoples (Alfred, 2009). A key goal of colonialism is exerting control over territory (Wolf, 2006). Arguments for control over territory that justify

colonial action were historically and remain today, embedded in the dominant western worldview.

The colonial process in Canada includes the active management of Indigenous people, including state control over who is a recognized "Indian", and displacement from, or asserting sovereignty over traditionally Indigenous territories (Coburn & Atleo, 2016). The historical reserve allocations in BC illustrate state control over Indigenous people. Starting around 1850 reserves were allocated on the assumption that coastal First Nations subsisted mainly off the sea and did not use the land (Harris 2004; Coburn & Atleo, 2016). As a result, tiny reserves were allocated to coastal First Nations. Indigenous access to land off the reserve was restricted, guaranteeing settler access to most of the land base (Alfred, 2009). Land allocation and restriction of Indigenous access to lands beyond the reserve are evidence of the historical control exercised by the state over Indigenous people (Harris, 2004).

However, in the last 50 years Indigenous advocacy and activism, as well as an ideological shift in governance have contributed to an evolution in the relationship between Canada and Indigenous peoples (Atleo, 2009; Kulchyski, 2013; Pasternak, 2015). First Nations governments are more regularly being consulted as legitimate stakeholders in land use decision making. Additionally, the courts have begun to recognize that Indigenous land use may be incompatible with colonial land use practices (Canning, 2018, in press). Indigenous groups and voices are increasingly able to advance territorial demands and their rights are slowly being acknowledged by the courts and the state.

The state has responded to increased obligations towards First Nations by stepping back from active management of resources on Indigenous lands. Instead private property and markets are being proposed as a means for First Nations to assert control over their land (Alcantara, 2008; Aragón, 2015). Unfortunately, these arguments for free markets and private property embed a western relationship to the land as the appropriate way to manage land and natural resources (Alfred, 2009; Coburn & Atleo, 2016). The relationships created by such policies are firmly rooted in the same colonial-capitalist system that has been forced onto Indigenous communities through the more traditional mechanisms of colonialism, including residential schools, resource exploitation, and the expropriation of Indigenous peoples from their lands (Alfred, 2009).

As the Canadian state tries to step back from active management of Indigenous lands corporations are becoming the dominant actor in proposing and acting on development ideas (Cameron & Levitan, 2014; Pasternak, 2015). The shift to a corporate led approach to management of Indigenous peoples and lands does nothing to distance Indigenous people from the western worldview that informs colonization, it only changes the colonial actors. The new approach constrains the Indigenous decision space within the neoliberal policies and capitalist incentives inherent to corporations (Atleo, 2009; Pasternak, 2015). Indigenous people should be able to choose to engage with these structures, however, they are currently given little choice and are forced to launch court cases when their rights are subjugated to elements of the individualistic, growth focused, western worldview without their consent (Cameron & Levitan, 2014; Coburn & Atleo, 2016).

Indigenous people are seeking increased control over decisions concerning their territory. However, land use decisions are currently being driven by governments and corporations that rely on a colonial relationship to justify their territorial interests, interests that are grounded in the western worldview. Indigenous land use practices and strong environmental protection can both be at odds with current decision-making structures and values. This paper embraces an approach to environmental concerns that acknowledges the complicity between colonialism and environmental degradation.

Situating research in solidarity with Indigenous resurgence

> *"Involvement in research with First Nations will be a political act regardless of the researcher's intentions."* – Charles Menzies (p. 26, 2001)

There is a clear need both from the perspective of decolonization and from concerns over ecological stability to foster alternatives to the dominant western worldview. Research agendas for new earth-centered ethics (Schmidt et al., 2016), and the research program of the Ecological Law and Governance Association (IUCN, 2016) are both important efforts to re-conceptualize the earth-human relationship. However, we can also foster ecological practices by re-legitimizing other thought systems and sources of knowledge that already exist and have existed for thousands of years (Atleo, 2011; McGregor, 2005; Mignolo, 2007). This approach has the added benefit of directly contributing to efforts of decolonization.

Indigenous peoples are or can be embedded in knowledge, cultural practices, ways of learning, and languages that were well established prior to European contact. Traditional ways of life, knowledge, and world views that Indigenous peoples have accumulated over millennia of place-based living are collectively referenced under the umbrella of Indigenous Knowledge (McGregor, 2005). Specifically, for Indigenous scholars like Deborah McGregor (2005), Indigenous Knowledge promotes mutual flourishing and wellbeing through the relationship between creation and all living beings.

In "The Principles of Tsawalk: an Indigenous approach to global crisis", Umeek (Richard E. Atleo), shares Nuu-chah-nulth knowledge that he argues can inform how we live in response to today's global crisis (Atleo, 2011). He draws on traditional teachings to present Tsawalk "everything is one" as a framework for constitutions, philosophy, and worldview. In particular he draws on stories of how his ancestors navigated their relationship with the rest of the living world. Relationships between all living things were governed by protocols. Protocols governed when a resource could be harvested, how much could be taken, and ensured respect between all participants. Protocols, he argues, are one example of how an Indigenous world view remains relevant today and could radically change the relations between all things.

Indigenous knowledge, such as the Nuu-chah-nulth knowledge shared by Umeek offer an example of how Indigenous worldviews can inform radically different approaches to land management and the attendant environmental consequences. Empowering Indigenous Knowledge through decolonization efforts and supporting Indigenous voices has great potential to address environmental crises.

Indigenous Knowledge rests with Indigenous people. Western researchers should not try to independently address environmental crises through Indigenous Knowledge, instead partnerships are required (McGregor, 2005). Academics often have time, knowledge, and access to resources that Indigenous communities and knowledge holders do not. So, rather than draft a vision addressing environmental issues or colonization from documented traditional ecological

knowledge, researchers should look for ways to empower and give voice to Indigenous communities and knowledge holders.[1]

Thus this research will support on the ground Indigenous voices that already have a vision they are trying to implement. Work with Indigenous groups is a political act (Menzies, 2001). The challenge put forward by Charles Menzies is for those seeking to conduct research with First Nations to make explicit the political commitment in their research. The political commitment sought by Menzies and others is one that contributes to the decolonization of Indigenous people (Menzies, 2001; Kulchyski, 2013). Sincere allyship and effective engagement with Indigenous Knowledge have all influenced the approach used here in working with Indigenous people. This work strives to contribute tools to the ongoing struggle for decolonization by working with Indigenous activists to define research priorities and find complementarity between their work and my own academic research interests.

Accepting that my research partners have a strong vision for their territory that is rooted in (among other things) Indigenous Knowledge I asked them how I could support their efforts. I have worked with Caleb Behn, an Indigenous community leader and lawyer on Treaty 8 territory who works on resource management concerns, to refine a useful research question and area. Caleb Behn works with a local organization called Keepers of the Water and we discussed concerns that he felt would apply to their mandate. The concerns discussed included water access, conservation on Indigenous territories, hydraulic fracturing, and the cumulative social and environmental impacts of extraction on Treaty 8 territory. Specifically, he asked for clear information on how corporations and capital are shaping the use and exploitation of their territories. In particular a "corporate map" of the region around the Montney shale would provide a useful research output. Our discussion led to a proposal for a corporate map that will outline some of the connections between corporations, decision makers, communities, laws, financing, and the natural world. A corporate map of natural resource extraction on a portion of Treaty 8 territory will provide information to help understand and challenge corporations while also exposing key dimensions of the colonial process.

[1] Researchers such as Monica Mulrennan and Colin Scott have gone so far as to co-author papers with their research communities (Mulrennan et al. 2012).

Research Question and Background on Treaty 8

How do individual corporations relate to the extraction of natural resources on Treaty 8 territory in British Columbia? Which networks are resource extraction operations embedded in?

Place, People, and Industry

Treaty 8 is one of the historic numbered treaties. First signed in 1898-1899, it was not until the 1950's that the last sovereign chiefs in the Treaty 8 region finally signed the treaty. At over 840,000 square kilometres Treaty 8 is the largest treaty area in Canada, stretching north from Northern Alberta to the Great Slave Lake in the Northwest Territories, east to Northwestern Saskatchewan, and west to the Northeastern quarter of British Columbia (Government of Canada; Indigenous and Northern Affairs Canada, 2009). Treaty 8 also happens to cover a large portion of known fossil fuel reserves in Canada, including the Athabasca sands, and 4 unconventional shale plays found in British Columbia.

In Northeastern BC there are six signatory nations to Treaty 8: the West Moberly First Nation, the Halfway River First Nation, the Saulteau First Nation, Prophet River First Nation, Doig River First Nation, and the Fort Nelson First Nation (Treaty 8 Tribal Association, n.d.). The Treaty 8 Tribal Association was formed by these nations to provide them with advisory services, to preserve cultural heritage, protect their environment and assert historic Treaty 8 rights and interests (Treaty 8 Tribal Association, n.d.).

The territory of these six Treaty 8 nations has been and continues to be a center of resource extraction for BC. BC's economy is currently and historically heavily dependent on resource exports (Markey, 2014), and successive provincial governments have sought to facilitate resource extraction from the region through non-treaty agreements and legislation (Garvie & Shaw, 2016; Stephenson et al., 2012). Treaty 8 territory is filled with valuable resources. The boreal forest represents an important source of wood fibers, while the earth beneath holds coal, hard-rock minerals, and some of the most profitable natural gas resources in the country. The Peace River region of Treaty 8 territory also boasts impressive hydroelectric resources including two existing BC hydro dams and the Site C hydroelectric dam currently under construction. Even

wind energy is abundant on Treaty 8 territory, with over a third of potential wind energy sites in BC found in the Peace River/Treaty 8 region (BC Hydro, 2013).

The abundant resources of Treaty 8 territory and the existence of a treaty giving a degree of certainty to industry have meant significant industrial development across the region. Industrialization and extraction of resources on Treaty 8 territory is not without conflict. Conflicts and concerns have risen regarding sustainability, cumulative impacts, inclusion of Frist Nations in the decision-making process, and competing land uses.

Industrial impacts are particularly pronounced on the boreal forest. The boreal forest of Treaty 8 is also central to cultural continuity for Treaty 8 nations. Healthy forests are crucial for maintaining woodland caribou populations (O'Brien et al., 2006; Wittmer et al., 2005) providing areas for First Nations to hunt and trap, and maintaining regional biodiversity (Schmiegelow & Mönkkönen, 2002). Unfortunately natural gas exploration, forestry, road building, mine construction, even clearing power lines and access roads to wind farms create additional linear disturbances fragmenting this habitat. Estimates made before the oil and gas boom indicated that by 2060 all high value boreal forest outside of parks will be gone from the southern half of Treaty 8 territory (Schneider et al., 2003).

Mapping the extent of oil and gas activity on Treaty 8 territory helps establish the root of concerns and conflicts over resource extraction. Figure 1 maps oil and gas wells by watershed, including an inset of the Kiskatinaw River watershed. The Kiskatinaw watershed has the most active well sites of any sub-basin watershed in BC. Previous studies have found that oil and gas exploration in BC has left up to 9.98km of linear disturbance per square kilometre (Stephenson & Shaw, 2013). Linear disturbances from exploration activities involve clearing straight or nearly straight lines through the forest in order to place seismic charges used in resonance imaging. Other linear disturbances cutting through landscapes include roads and powerline right of ways. Using GIS tools I have tried to add to the impacts research by estimating the impacts of ongoing oil and gas extraction.

All active natural gas extraction in British Columbia takes place on Treaty 8 territory. Of the 32705 potential, decommissioned, and existing wells listed on Treaty 8 lands, 11384 are

active. As of January 2018, public government records document another 50 wells being drilled (BC Oil and Gas Commission, 2018).

Wells are unevenly dispersed across Treaty 8 land. Well placement reflects drilling rights, presence of oil and gas resources, and market conditions. Drilling rights are issued by the provincial government through a public bidding process, dictating which areas of the territory are opened up for further exploration and extraction. The majority of active wells are clustered over four main oil and gas bearing shales: the Liard Basin, the Cordova Embayment, the Horn River Basin, and the Montney Shale. Market conditions also influence well placement: the Horn River Basin is a very economical resource to frack but it produces dry gas, while the Montney region is currently generating significant natural gas liquids (Rivard et al., 2014). Natural gas liquids such as propane and butane fetch a much higher price than "dry" natural gas and can keep natural gas wells profitable even as the price of dry gas remains very low. Thus new wells are predominantly targeting shales with high liquids returns.

To illustrate the ecological impact of oil and gas extraction, I estimated impacts on air quality and chose proxies for habitat degradation. These calculations exclude vented gas from processing plants, emissions from transportation activity, and any fugitive emissions from pumping stations. By conservative estimate, there are approximately 5040 square kilometres of Treaty 8 territory in BC whose air quality is affected by active natural gas extraction.

I have chosen the terrestrial footprint of extractive activities as a proxy for habitat degradation from oil and gas extraction. The terrestrial footprint calculated for oil and gas extraction on Treaty 8 territories is an estimate based on available records. The total area that will be kept clear of vegetation and used for the duration of well-activity is approximately 100 square kilometres. The total edge area that will be maintained throughout active well life and post production monitoring is 2200 linear kilometres.

With hundreds of square kilometers of active land use and over 5000km^2 of air born impacts the scope and scale of natural gas extraction on Treaty 8 territory is imposing. However, the environmental costs of natural gas extraction are just part of the footprint of resource extraction activities on Treaty 8 territory in BC.

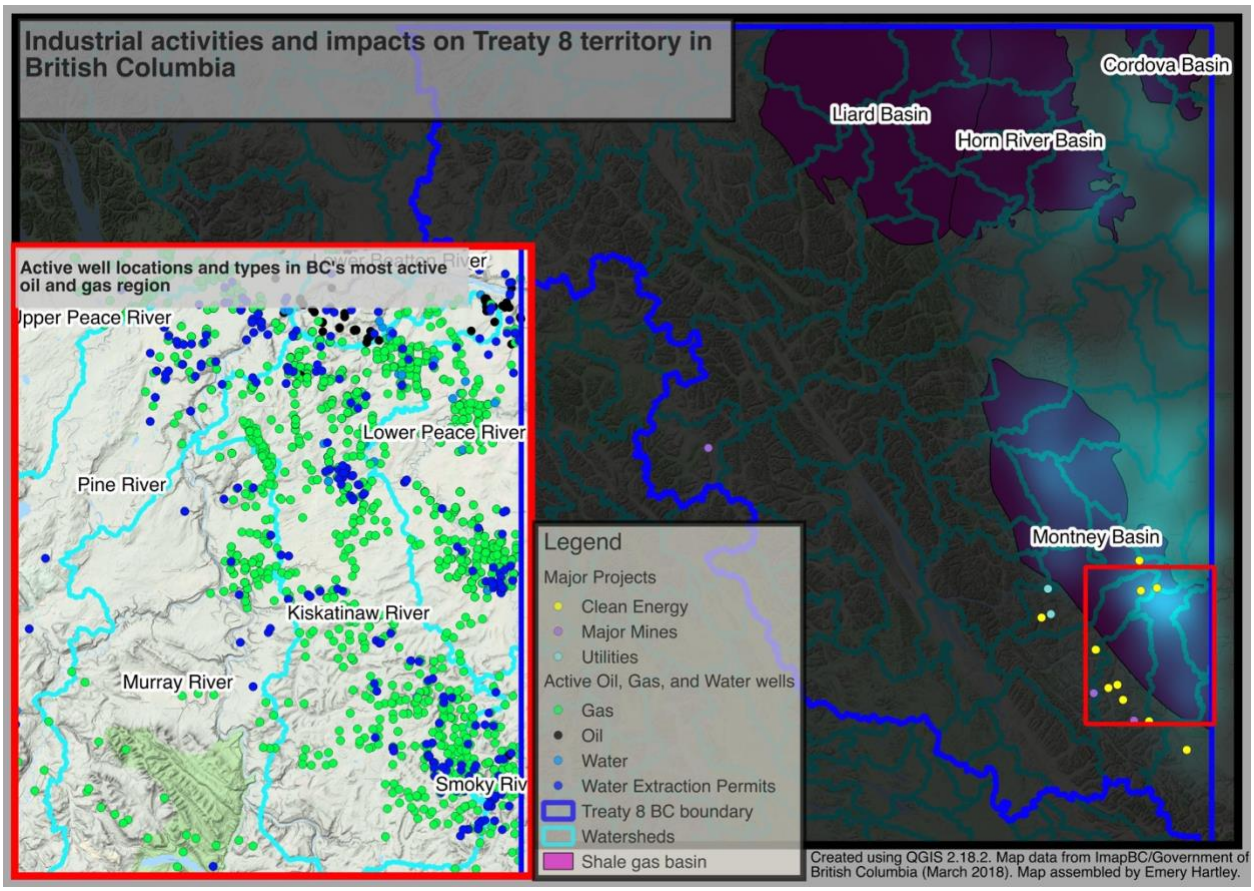

Figure 1: Heat Map of Oil and Gas Extraction on Treaty 8 Territory

Figure 1: This heat map of Treaty 8 territory shows the relative density of oil and gas wells, as well as specific locations for major projects. The heat map regroups 32705 well sites, including decommissioned, suspended, and abandoned wells to give an impression not only of current environmental liabilities, but the historically incurred environmental debts. The concentration of wells is represented by the intensity of the light blue shading. The navy-blue outline encompasses recognized Treaty 8 territory in British Columbia, while the light blue outlines depict sub-basin watersheds (50,000ha-500,000ha in size). On the main map there are markers for the major projects reviewed in this study. The yellow dots are for "clean energy" including wind farms and hydroelectric projects. Light purple markers indicate mines, both hard-rock and coal, while the purple dots indicate major utilities projects, both the projects reviewed here are expanded powerlines.

The inset of Treaty 8 shows active drilling sites and active wells in the Kiskatinaw River watershed, this is the watershed with the most active well sites in British Columbia. The green dots are natural gas extraction wells, the black dots are oil wells, and the sky-blue dots are water injection sites for disposal of fracking fluids. The dark blue markers indicate water extraction permits, many of which will be used to supply water for the hydraulic fracturing process. A full list of active wells by watershed is available from table 8 in Appendix A.

Industry and First Nations in BC

Natural gas exploration and extraction impacts forests, air, and water, but it has other important regional implications. A 2014 study by Kathryn Garvie and colleagues documents the resource rush for natural gas on Treaty 8 territory, and the lack of engagement with First Nations (Garvie et al., 2014). In particular it was noted that the provincial government received 3.6 billion dollars in sales and royalties from natural gas leasing in Northeastern BC between 2005 and 2012, yet Fort Nelson First Nation, on whose traditional territory these sales took place, was not consulted on petroleum and natural gas tenures until June 2012. These findings reflect concerns that the BC government has taken an industry first approach to regulating and expanding the fossil fuel industry in the province (Stephenson et al., 2012).

Natural gas extraction has been directly related to violations of environmental rules and guidelines. In 2017 the Petronas subsidiary Progress Energy was found guilty of having built at least 16 dams without proper environmental assessment or permits (Parfitt, 2017). Interviews with government officials suggest the regulatory failure may extend to over 100 water diversion dams throughout the region (Parfitt, 2017). Such regulatory failure is in part a consequence of the professional reliance doctrine used by the provincial government. Under professional reliance companies become responsible for monitoring and reporting on the environmental impacts of their operations.

Illegal dams are one of the many abuses of water resources on Treaty 8 territory. Concerns over flooding and contamination from fossil fuel extraction are also prevalent. Indeed, water resource governance has become an issue that bridges several resource sectors. Additionally, government is felt to be a poor regulator of industry access to water. Specifically, government panels and processes tend to be set up to favour industry (Brisbois & Loë, 2017). Government purposefully limits the scope of research, panels, and working groups to ensure industry interests are protected; in return guaranteeing industry participation (Brisbois & Loë, 2017). An example presented in the next section on the omission of human-health impacts of extraction from BC's LNG review panel is an important illustration of this governance approach (Linnitt, 2018).

The issues illustrated above have generated a significant response from Treaty 8 nations. Concerns have primarily been articulated around land and water use, land access, and the cumulative impacts of extractivism. The demands of regional First Nations can be understood from an environmental justice lens (Page, 2007). Environmental justice struggles are common at "extraction frontiers" (Martínez-Alier, 2012). Such struggles focus on obtaining recognition for local actors, establishing fair procedures for inclusion in decision making, and ultimately leading to a fair distribution of decision-making power and profits from extraction (Page 2007).

Historically Treaty 8 nations have been regularly excluded from much of the decision making on their territories. The example mentioned earlier regarding the sale of natural gas tenures is one recent example. More recently still, in 2014 the provincial government tried to exempt sweet-gas processing plants from environmental review in BC (Garvie & Shaw, 2015). Fortunately, a swift response from the Fort Nelson First Nations and a number of other nations prompted the government to rescind their decision (Garvie & Shaw 2015). Again however, it is easy to see how First Nations were excluded from the decision-making process and had to fight for inclusion.

The quest for environmental justice by Treaty 8 nations also includes demands for heightened regulation, especially of cumulative impacts. While many First Nations in the region maintain they are not against economic development on their territory, they argue that cumulative impacts are not being properly monitored or managed. Member nations of Treaty 8 have even taken their concerns over cumulative impacts on their territories to court in treaty disputes (*West Moberly First Nations v. British Columbia (Chief Inspector of Mines)*, 2011). Cumulative impacts can lead to rapid degradation of the natural environment and to other consequences un-anticipated under the current environmental review process. Challenging cumulative impacts will require challenging extractivism as the driver of the regional economy.

Research Context: Extractivism

The pursuit, removal, and transportation of natural resources from remote regions to centers of industrial and financial power defines extractivism. Extractivism is a core component of modern industrial capitalism (Acosta, 2013). Key characteristics of regional economies conforming to the process of extractivism are: significant foreign ownership of resource rights,

loss or lack of local democratic influence, single industry dominance, regional dependence on profits from the extractive sector, little concern for environmental and social costs of extraction, and an "extract or die" mentality among governing officials (Acosta, 2013; Svampa, 2013). Extractivism plays a pivotal role in facilitating global growth. As global energy use increases, so too must energy production (Smil, 2010). Many countries that are net energy exporters are caught in an apparent "resource trap", where a country becomes dependent on resource exploitation for their economic wellbeing (Svampa, 2013). Countries in the throes of a "resource trap" display many of the key features of extractivism, including the erosion of democratic institutions, environmental degradation, and increasing social inequality (Adkin & Miller, 2016; Svampa, 2013).

Another feature of extractivism is that previously "unproductive land" is taken up by companies and rolled into their working land base (Svampa, 2013). The move towards marginal resources is consistent with "peak oil" and other resource depletion theories. Specifically, as the most easily accessed and profitable resources become depleted industry expands the search for new resources to maintain resource flow, even at declining returns on investment (Bardi, 2009). Places such as the Peace River region of British Columbia and the remaining Treaty 8 territory display alarming similarities to other communities impacted by extractivism.

The politics and behaviour of extractive industries and governments on Treaty 8 territory reflect many of the observed patterns of extractivism. One of the expected outcomes of extractivism is the displacement of local people. Recently when commissioning a study of the effects of hydraulic fracturing for natural gas extraction in Northeastern British the provincial government decided against including health effects on humans in the study (Linnitt, 2018). The decision to exclude human health impacts means that direct effects felt by local populations will not be examined by government. As a result people living near natural gas extraction may be forced to leave impacted areas.

Erosion of democratic accountability and processes is another feature of extractivism. Alberta, the most important province in oil and gas extraction in Canada, has been compared to a petro-state (Adkin & Miller, 2016; Carter & Zalik, 2016). Particularly this means that the state is heavily dependent on fossil fuel revenues and publicly links resource extraction with the

provision of public goods such as education thus legitimizing the state's defence of fossil fuel industry interests (Carter & Zalik 2016). Authors such as Meg Sherval (2015) have also noted that rhetoric at the national level is tying development of fossil fuels with national identity (Sherval, 2015). Like Alberta, British Columbia has also seen democratic practices undermined by oil and gas interests. In 2016, BC released a climate action plan that was widely criticized by the plans known contributors as not reflecting their input at all. A year later FOI requests obtained by the Canadian Center for Policy Alternatives revealed that there had been a series of secret meetings in Calgary Alberta at the Canadian Association of Petroleum Producers (CAPP) board room between provincial officials from British Columbia and representatives of the fossil fuel industry (Daub & Yunker, 2018). The changes to BC's 2016 climate action plan reflected the input of CAPP and other industry groups including the BC LNG alliance. This egregious display of corporate influence over the decisions of democratic bodies reflects an erosion of democracy concomitant with extractivism.

Extractivism is the manifestation of the capital accumulation processes at the periphery. Acosta (2013) tracks the social patterns of extractivism back 500 years to the colonization of Africa and the Americas by European imperial powers. Capital accumulation in the core European powers was dependent on the creation and extraction of wealth from peripheral colonies. Today, like then, the most corrosive effects of extractivism are felt in communities that have been marginalized and gain little from the wealth and development of core regions (Healy et al., pg 93, 2013). The wealth of core regions benefits from extractivism in peripheral regions. Extractivism requires control over distant territories. When Indigenous people are being displaced or Indigenous interests subsumed to promote extractivism then the control that is exerted conforms to ongoing colonial practices (Wolfe, 2006).

The extraction of natural resources remains central to the process of capital accumulation (Acosta, 2013; Harvey, 2003). Natural resources form an important part of the cultural myth of Canada (Cameron, 2015). They are taken from "resource hinterlands", regions where communities are perceived to exist solely to supply raw resources to our metropolitan and industrial centers (Markey, 2014). The companies and governments teaming up to extract natural resources are the base of an unsustainable extractivism (Acosta, 2013; Svampa, 2013).

Extractivism in Canada cannot be separated from its environmental ramifications or its colonial context and implications.

Extractivism, Capitalism, and Colonization

The resource conflicts on Treaty 8 territory are in part driven by Indigenous demands for recognition, inclusion in decision making procedures, and fair benefits from the extraction on their territories. Unfortunately, there are many countervailing factors to their quest for environmental justice. It is insufficient to say that First Nations have been excluded from decision making. Indeed, it is imperative to understand that the structures of capitalism and colonial governance today are articulated in a way that is antithetical to many of the demands and interests of First Nations (Coulthard, 2014). This section briefly outlines links between capitalism and colonialism, the displacement of Indigenous people for capital accumulation, and the continuation of these practices under neoliberalism.

Provincial and federal governments, as well as industry leaders argue that the interests of First Nations would be best met by economic development, and that all that is missing for that to happen is a "stable investment environment" (Alcantara, 2008; Aragón, 2015; Flanagan et al., 2010). Such arguments frame Indigenous wellbeing within classic capitalist economic theory (Alfred, 2009; Cameron & Levitan, 2014; Pasternak, 2015). The framing of Indigenous wellbeing within capitalist development is problematic because it is imbedded in a much older relationship, that between capital and settler colonialism (Harris, 2004). Colonialism and capitalism are distinct elements of the economic process, but they have and continue to go hand in hand (Harris, 2004; Pasternak, 2015).

When Indigenous wellbeing is equated with capitalist growth group rights, collective rights, and aspirations distinct to aboriginal people are erased (Coulthard, 2014). Instead Indigenous wellbeing becomes subsumed by extractive capital and the assumption that wellbeing for all groups can be met through the same unsustainable growth paradigm. Extractive capital refers to the corporations and individuals with the allocative power to drive resource extraction. The alignment of colonial governments and extractive capital interests are evident when land regulation efforts such as modern treaty and side agreements such as the Natural Gas

Benefits Agreements in BC are shaped to favour resource extraction (Kulchyski & Bernauer, 2014).

The approaches of provincial and federal governments to relationships with First Nations are and have historically been motivated to support capital (Harris, 2004). Often, government roles in supporting capital require the creation or support of the conditions of accumulation. Accumulation is the creation or transfer of physical assets into the market economy (or more profitable use within that economy) (De Angelis, 2001). Creation and control of the conditions of accumulation are key features of colonial-capitalism (Harvey, 2003). The conditions necessary for accumulation include resource access, favourable regulation, and the previously mentioned "stable investment environment".

Some authors identify four categories of accumulation: by enclosure, by dispossession, by expanded reproduction, and by toxicity (Harvey, 2003; Demaria, 2010; Martínez-Alier, 2012). Accumulation by enclosure (or primitive accumulation) is the act of creating private property or other conditions for capital accumulation from a commons, historically this has included taking land and resources through force. Accumulation by dispossession remains a key source of capital and occurs when resources, wealth or land is taken from one group and appropriated by another, usually wealthier and more powerful (Harvey, 2003; Hartsock, 2006). Expanded reproduction refers to the value added through the labour process and is typically the most widely discussed mechanism for creating wealth in a capitalist society. Accumulation by toxicity are those profits dependent on zero or low-cost disposal of toxic waste (Demaria, 2010; Martinez-Alier, 2012). Each type of accumulation requires the coordination of capital and colonial power.

Glen Coulthard asserts that Indigenous rights have predominately been recognized in contexts where they do not interfere with capital accumulation (Coulthard, 2014). Different types of accumulation have different social, political, and economic consequences. To understand the consequences of accumulation on Indigenous rights, it is helpful to know that many Indigenous rights are use based (Coulthard, 2014; Kulchyski, 2013). Use based rights are derived from historical and continued practices by Indigenous people. When animals or land are poisoned by industrial processes Indigenous groups often respond by halting the harvest of those resources, thus their use rights are obstructed. Additionally, reduced Indigenous access to traditional

resources can create a dependence on resource extraction work. The cycle of extraction, leading to reduced access to traditional resources, in turn leading to increased reliance on participation with industrial activities provides a striking example of accumulation through toxicity. Government actions such as the allocation of natural gas exploration and extraction permits from 2005-2012 without consulting the Fort Nelson First Nations are clear examples of accumulation by dispossession, where land rights have been stripped from Indigenous groups in order to favour extractivism.

It is important to note that while accumulation in BC remains heavily dependent on natural resource extraction its drivers are slowly changing. Neoliberalism entails a shift from government driven development to corporate driven development (Peck, 2001). The provincial and federal governments are increasingly interested in simply ensuring a smooth operating environment for companies conducting resource extraction (Pasternak, 2015; Peck, 2001), leaving corporations responsible for negotiating the conditions of capital accumulation.

Increasingly corporations are acting as their own negotiators in securing resource access by entering into private regulatory agreements between themselves and First Nations. One style of such contracts is the Impact Benefit Agreement (Cameron & Levitan, 2014). Impact Benefit Agreements (IBAs) are negotiated between a corporation and First Nations. IBAs outline the obligations of both parties to each other, including compensation to be received by First Nations and the resources to be accessed by a company (Cameron & Levitan, 2014). While IBAs can empower First Nations, they have also become a new mechanism for companies to secure access to land thus ensuring a condition of accumulation. IBAs can even constrain the types of land use demands First Nations can make once an agreement has been signed (Cameron & Levitan, 2014).

Under this neoliberal turn in resource governance, corporations are driving capital accumulation through negotiated access to land, a role previously carried by governments (Pasternak, 2015; Wolf, 2006). The neoliberal turn in governance means that increasingly corporations will be in charge of negotiating the terms of control over territory, while the state's role will be relegated to one of supervision and enforcement. Capital, industry, and individual extractive companies are already driving much of the ecological degradation and conflict on Treaty 8 territory. If the neo-liberal trend dominating Indigenous-federal relations in other parts

of the country[2] is mirrored in BC then we can only expect the magnitude of corporate power and the importance of their central role in extractivism to continue to grow.

Corporate Power Mapping

Extractivism provides a useful frame for understanding the current articulation of colonialism on Treaty 8 territory. While governments play an important role in colonialism this research focuses on the corporate actors as central in the future articulations of colonialism (Pasternak, 2015). Corporate power can be used to explain the role of individual companies in resource extraction, but also shed light onto the extractive network linked to Treaty 8 territory. Corporate power mapping is a compelling approach for situating corporations within extractive networks and understanding their regional influence, while also providing information useful to an engagement framework for local Indigenous activists.

Corporate power mapping combines power mapping methods with data collection from power structure research. Power mapping is a family of methods for assessing political context (Noy, 2008). Rooted firmly in union organizing of the 1970's, power maps of companies provide strategic outlines of the social and economic terrain in order to inform and supplement organizational and activist interactions with a set of corporate actors or over a defined territory (Noy, 2008; Pfeffer & Salancik, 2003). Power maps are goal oriented, requiring data collection to be tailored to specific inquires and organizational or situational needs. Power mapping of companies can be combined with corporate mapping, more commonly called power structure research, a social network analysis technique focused on quantifying and characterising the relationships between companies. Using data on corporate ownership and overlapping boards of directors, this paper will map and visually display the interrelations of corporate players on Treaty 8 territory.

The mapping of corporate relations on Treaty 8 territory builds on a larger Corporate Mapping research project focused on carbon extractive companies in Canada. The Corporate Mapping project is a SSHRC Partnership grant co-managed by Shannon Daub at the Canadian Center for Policy Alternatives – British Columbia (CCPA-BC) and William K. Carroll at the

[2] See Cameron and Levitan 2014 for a compelling examination of neo-liberal re-regulation of Indigenous-other relations. See Pasternak 2015 for a critical examination of neoliberal thought re-shaping federal-Indigenous relations.

University of Victoria. Using social network analysis (SNA) and other political economy approaches, the project provides a range of research on the influence of the fossil fuel industry in Canada (Carroll, 2017). In British Columbia the project has focused primarily on corporate influence on the provincial government (Graham, et al. 2017). Their research will undoubtedly help clarify links between resource actors and the regulatory environment but differs from my research project by focusing on the relationship between corporate actors and the provincial government. My research focuses on corporate relationships and influence specifically over Treaty 8 territory.

The theoretical contexts for corporate mapping and power mapping are similar. Both approaches agree that corporations wield significant power and influence in today's society (Farnsworth & Holden, 2006; Miller & Harkins, 2010). The power and influence of corporations begins in the economic realm but extends well into the social, or extra-economic, spheres (Carroll, 2004). Power in this research draws on Luke's notions of power, both as the ability of one actor to affect another in a way contrary to their interests, but also that power is most effective when unobserved (Carroll, 2004; Piper, 2005; Schiffer, 2007). It is important to note that the power corporations hold comes from their control of capital (money, technology, and people) (Harvey, 2003; Carroll, 2004). The sources of capital belonging to a corporation shape the expressions of corporate power.

Power obtained through capital is generally exercised as strategic, operational, or allocative. Strategic power in corporations belongs to company directors, and includes the ability to sign agreements, set company policy, and choose management objectives. Operational power concerns the day to day operations of a company. Power associated with the control of credit or the distribution of financial resources is referred to as allocative (Carrol, 2004). Power mapping focuses on the reach of corporate power in the community, while corporate mapping traces the links between companies that shape or express power.

The control exercised by corporations is not restricted to the direct exercise of power, they also have tremendous influence extending well into the social sphere. Corporate influence can also be categorized. Miller and Harkins (2010) categorize influence as being derived from reach and social cohesion. Reach involves the overlap between companies and regulatory bodies,

civil society, or government. Social cohesion comes from networking between company directors, leading to common goals, ideals, and views among corporate elites (Carroll, 2004; Carroll & Sapinski, 2011; Graham et al., 2017).

Knowing the reach of corporations extends well beyond the internal behaviour of any one company, but also knowing that the material and environmental consequences can always be traced back to a company, heavily influenced the choice of data collected for this corporate power map. Using the notions of power and influence we can begin to understand the mechanisms integrating corporations into communities and societies, and what data might reveal them. At the regional level in Treaty 8 we would expect both corporate power and corporate influence to be evident. Corporate power will be evident through the material footprint of companies, their role in the local economy, even the prevalence of corporate donations throughout the community (allocative power). Influence will also be on display. For example, a story covered in "the Price of Oil" demonstrated the extent to which companies operating in Saskatchewan influenced local life, with residents choosing to stay silent about potentially lethal sour gas leaks rather than face the social sanctions and possible retaliation associated with speaking out (McSheffrey et al., 2017). Company reach may also be evident in local government advisory committees, the participation of corporations in setting regional policy, and even in the language of local media outlets.

At the national level corporate power is mostly diffuse. Few of the companies operating on Treaty 8 territory will have the necessary power individually to influence the national economy. However, companies will still be interested in influencing national policy and capturing regulatory bodies (Pfeffer & Salancik, 2003; Carroll, 2004; Miller & Harkins, 2010). Knowing that individual corporations may have little power at the national scale does not deter from the fact that companies, or more importantly broad corporate interests, do have a significant influence on national policy (Carter & Zalik, 2016). At the national scale, corporate influence from groups of companies replaces the power of individual companies as the primary approach by corporations to capture policy decisions. Influence at the national scale is primarily developed through network reach and social cohesion. Network reach includes members of government with industry ties as well as industry advisors and directors with previous government affiliations.

Social cohesion includes interlocking directorates and other forms of alignment between corporations and the managerial class. Social cohesion helps companies establish common interests, while network reach helps companies and industry associations gain direct access to decision makers.

Tracing corporate power and influence requires data focused both on the Treaty 8 area and the national and international networks those companies are embedded in. Power and influence cannot be measured directly (Schiffer, 2007), but knowing the composition of corporate networks I can create power and influence profiles for individual corporate actors and whole industry sectors.

This research collects several indicators of corporate power, including financial data, financial ties between companies, project figures, and qualitative details on corporate citizenship. Data on company financial status and preferred financial mechanisms for funding projects helps qualify the allocative and operational power of a company. Financial transactions between companies such as the sale of shares, loans, and cash transfers within a corporate family represent the exercise of allocative power between corporations (Carroll, 2004). We can expect companies with financial ties to share goals. Inter-corporate ownership is also a source of both allocative and strategic power that tends to align the interests of various companies. Statistics on company projects and industry figures are important for connecting instances of corporate power with tangible changes and effects on the landscape. Industry and company details, including any special mandates, discussions on Indigenous rights, and partnerships with local communities represent important qualitative details that can figure prominently in explaining and revealing the effects of corporate power.

There is also a significant body of work dedicated to tracking and revealing corporate influence that can be echoed here (Carroll & Sapinski, 2011; Graham et al., 2017; Miller & Harkins, 2010; Sapinski, 2017). Most of these works focus on social cohesion through board interlocks, and to a lesser extent company reach into government. Board interlocks are key mechanisms in creating social cohesion (Brownlee, 2005). By applying social network analysis (SNA) to board interlocks, it is possible to visualize the links between different companies. Drawing on SNA and political economic analysis, the links between different companies and the links between

individual directors created by interlocking directorates can be used to identify communities with common interests. The diversity of industries present in an interest community is a strong indicator of how narrow or broad that community's interests will be (Brownlee, 2005; Carroll, 2010). Revealing corporate communities and corporate influence is an important contribution to Caleb Behn's work.

Combining power structure research, referred to here as corporate mapping, with power mapping provides unique information about the extractive network operating on Treaty 8 territory. These techniques can help visualize and describe the web of corporate power and influence, including the exercise of allocative power and community reach. The extractive footprint of corporations on Treaty 8 territory expands well beyond the physical effects of extraction. The results of network analysis and qualitative data collection will be presented in network maps, geographical maps, tables, and figures and used by Caleb Behn and Keepers of the Water in their engagement, conflicts, and conversations with corporate actors on Treaty 8 territory.

2. Research Methods and Approach

This research project has been significantly influenced by the service research concept (Trauger & Fluri, 2014). Service research situates the researcher as an actor within the social change process and allows research to evolve through discussion with community leaders and organizations. As previously mentioned this research is a response to an ask by Caleb Behn and the Keepers of the Water, and as such I have tried to situate it in the context of their social change work.

Caleb Behn and Keepers of the Water are concerned about the scope of extraction on Treaty 8 territory. In particular they were keen on information to help detail corporate influence over their territories and provide viable means of addressing this influence. There are a number of tools for intervention available to groups such as Keepers of the Water. Some of these tools include interceding on project financing, challenging projects through existing legal frameworks, questioning environmental impacts through citizen science, working across Indigenous groups to deny consent, and broadly influencing the social licence of extractive industries. Data that can serve these types of intervention tools include mapping the origin of extractive companies, tracking financial links, helping develop an "accountability ranking", relating companies directly to cumulative impacts, and showing the elite networks responsible for extraction on Treaty 8 territory.

After some discussion with Caleb Behn it was agreed that a corporate power map of Treaty 8 territories should: re-iterate the scope of resource extraction, provide details enabling intervention by First Nations, and demonstrate the colonial nature of corporate activity. The corporate power map of Treaty 8 territory will provide strategic information pertinent to the tools of intervention mentioned above. The data will include significant qualitative elements. The qualitative data will be used to provide high-resolution context on projects and companies, the aim of which will be to give the higher level social network analyses (SNA) local relevance. Ultimately the data collection will bridge geography and SNA to provide context for an environmental justice inspired discussion of extraction on Treaty 8 territory.

SNA is the study of links between actors in order to characterize networks and study social dynamics. SNA has been used for over 100 years to study corporate networks and critically assess corporate power, cohesion, and the formation of elite networks (Carroll & Sapinski, 2011).

In this research SNA will be important for situating wealth generated in BC's northeast with regards to global capitalism. The SNA will provide details on the global distribution of the networks of interlocking directorates and ownership networks of the companies operating on Treaty 8. SNA can also estimate the level of cohesion and pathways for cooperation between companies. Showing cooperation between external actors is an important piece of establishing a set of projects as colonial enterprises, in turn contributing to arguments for cooperation between Treaty 8 nations. But along with painting a picture of monolithic capitalism, SNA can tease apart the network, helping identify key actors or influencers that can later be targeted. SNA can also help formulate hypotheses on corporate behaviour such as which groups of companies are likely to have shared approaches to working with First Nations.

Ultimately the analysis and discussion aim to serve the broad interests outlined by Caleb Behn and Keepers of the Water. This chapter presents the research methodology and methods used. First I outline the types of geo-physical maps created during this research, where the data was collected and how these maps tie into the broader research mandate. Then the rationality for choosing which corporations to include in the corporate and power mapping research is outlined. Once the companies have been chosen I outline the data required to build a profile for each corporation. Lastly I review SNA as the core method in corporate mapping, including some theory and how SNA will be used in this research.

Methodology, Methods, and Data Requirements

Data collection for the portion of Treaty 8 territory overlapping with British Columbia focused on providing information relevant to the strategic aims of Caleb Behn and Keepers of the Water. This locally focused corporate map needed to pull relevant data together in order to provide meaningful synthesis for Indigenous actors. The data derives its relevance from being based on Treaty 8 territory and providing detailed and novel information on the companies operating resource extraction operations.

Data sources are predominately publicly available documents from ImapBC, the System for Electronic Document Analysis and Retrieval (SEDAR), corporate websites, industry profiles in investment news, the National Energy Board public documents database, and additional data that emerged using basic web searching techniques. The proprietary corporate database Orbis was also used to gather data on corporate actors, affiliated directors, and corporate ownership profiles. Additional data required to complete a social network analysis of fossil fuel companies operating out of BC were provided by the Corporate Mapping Project from their database of fossil fuel companies operating in Canada.

The data collected was combined to produce useful research outputs. A map of oil and gas extraction points on Treaty 8 territory was created using QGIS software and government data sets (QGIS Development Team, 2017). A social network analysis of the affiliations between oil and gas companies was completed using Ucinet software (Borgatti et al., 2002). The global distribution of corporate ownership was mapped out using QGIS. The results were synthesised and given local context through the integration of local qualitative data and financial data for individual companies. The following methods section describes the broad approaches to data collection and processing used in this research.

Geographic Information Systems: Land-use data collection and data analysis

SNA provides a powerful tool for understanding the reach and character of corporate networks. However researchers have demonstrated that corporate power and influence is unevenly distributed across space (Cox & Rogerson, 1985). Just as power and influence are unevenly distributed, so too are environmental impacts and consequences. Visual mapping of impacts can be contrasted with the corporate networks being studied, providing a powerful tool for use by community activists and furthering the analytical power of a SNA. Mapping of impacts and networks was achieved in this report using QGIS. QGIS enabled data extraction from government maps as well as results processing and map creation showing environmental impacts and corporate headquarters.

There are three types of QGIS maps included in this report (Figures 1, 3, and 4). First there are maps of operations and projects by watershed. QGIS enables map projections but also calculations of impacts by area, and well density (see Table 8 in Appendix A for summary results).

The second type of QGIS map uses area and density calculation tools to estimate and represent some of the environmental impacts of well operations, including the release of volatile organic compounds, methane, and other hydrocarbons (Witter et al., 2013). Lastly there are maps of corporate headquarters, demonstrating international ownership of extraction rights on Treaty 8 territory. Mapping the extent of operations, impacts and interrelation of international ownership in this report gives a basis to understand the extent of operations, provides indicators of areas most impacted, and qualifies the extractive network.

Mapping Territorial Impacts

Understanding the territorial impact of oil and gas companies requires territorial maps (Figure 1)[3]. The map of well operations by watershed was created using two layers from BC's provincial geographic database. The active well-heads layer was used as a proxy for industry activity and layered over the BC FWA watershed groupings map. Watershed groupings provide watershed areas of ~ 50,000ha and can be combined with well activity to calculate the density of industrial activity. This map provides an indicator of which watersheds have the largest footprint from natural gas extraction, and should help prioritize watersheds requiring the attention of groups such as Keepers of the Water.

The map of industrial activity is complimented by data on the ecological impacts associated with natural gas exploration and extraction. A joint study between the Fort Nelson First Nations and Karena Shaw's UVIC lab in 2014 highlighted that the linear disturbance from seismic exploration for natural gas on Fort Nelson First Nations territory created up to 9.98km of linear disturbance per square kilometre of surveyed land. Exploratory activities such as seismic testing and extractive activities such as road building create long lasting linear disturbances in the boreal forests found on Treaty 8 lands. Linear disturbances can increase dispersion of invasive species, facilitate predator access, and lead to habitat fragmentation (Brown et al., 2007; Becklumb et al., 2015; Schmiegelow & Mönkkönen, 2002). Unfortunately, it is difficult to establish the unilateral effect of these activities as most species have highly specific and variable reactions to habitat degradation (Haeussler et al., 2002).

[3] Deliberative and community based impacts modelling would have provided very interesting and powerful tools for community organizing and dispute resolution but were beyond the scope of this study. For discussions on deliberative modelling see : (Antunes et al. 2006; Maxwell & Randall, 1989)

Establishing per-species impacts of shale gas extraction is a project far beyond the scope of this thesis; however it is possible to estimate the total terrestrial area disrupted by natural gas well pads, the length of edges maintained by these activities, and the air quality impacts of well-sites. While most environmental impacts are associated with exploration and construction, well operation can also have lasting impacts. In particular there are lasting impacts on water quality and air quality. Even site maintenance has an impact by prolonging linear disturbances (Witter et al., 2013). A Government of Canada report suggests that the average well pad for unconventional natural gas extraction is between 2-3 Ha in area, while conventional well pads are from .5-1 Ha in area (Becklumb et al., 2015). The same report further found that air pollution from shale gas operations affected populations living within 1km of a well. Other studies have used 500m from a well head as the detectable limit for fugitive emissions (Atherton et al., 2017). I have used these figures in QGIS to create a conservative estimate of the local terrestrial and atmospheric footprint of well-head operations. The approximation of the terrestrial and airborne footprint of each active well, provides an estimate of the area that will be directly influenced by well operations until the site is decommissioned.

The impacts estimates do not include any impacts from compressor stations, transportation, and exploration. The data was also focused exclusively on active wells. A further complication is that BC does not disclose which wells being operated are considered to be accessing unconventional resources and which are tapped into conventional oil and gas pools. We do know that about 60% of wells in BC access unconventional resources (Becklumb et al., 2015); and that in areas such as the Horn River Basin about 85% of the wells drilled in 2010 targeted unconventional resources (up from 3.4% in 2005) (Garvie et al., 2014). Unconventional resources refer to oil and natural gas not accessible through simple well drilling techniques. Unconventional resources such as shale gas require hydraulic fracturing or other resource intensive techniques for extracting the fossil fuel resource. The increase in unconventional resources being accessed reflects the move towards marginal resources identified as a key feature of extractivism (Svampa, 2013). I have estimated the impacts of wells based on the figures available for conventional oil and gas extraction but highlight the growing portion of

unconventional oil and gas to re-iterate that I am offering a conservative estimate of the impacts of oil and gas extraction in northeastern BC.

Using BC government data on well site locations, activity, and well facility area permits, I have calculated terrestrial and atmospheric areas immediately impacted by fossil fuel extraction. Using QGIS I have established a conservative terrestrial buffer around all known active well locations (.5ha) as well as an atmospheric buffer with a 500m radius. Lastly, using the polygon data from the Oil and Gas Commission's Well/Facility Area Permits data file, I have extracted an approximate edge length for oil and gas activity. Due to the limited government data available on natural gas facilities, the edge calculations include most well sites along with gas facilities such as compression stations and regional hubs located on crown land. Pipelines are not included in these calculations.

Mapping Corporate Headquarters

The corporate headquarters maps (Figures 3 & 4) were created to complement the Ucinet generated network of interlocking corporate directorates (Figure 2). QGIS has a mapping function embedded in the MMQGIS plugin that allows mapping of networks onto geo-referenced points. I used the plugin to map the direct ownership links that exist between corporate entities. Cox and Rogerson (1985) used company headquarters as a means to spatially identify seats of corporate power. In their analysis of the South African corporate community it was revealed that companies were much more likely to have shared directorates within their own cities, but that 70% of all shared directorates favoured Johannesburg, situating it as an unofficial center of corporate power. Furthermore, their South-African data set allowed for a differentiation between cultural groups and showed that corporate links between cities were associated with cultural groupings for Anglos, Afrikaners, and a peripheral group linking non-core cities (Cox and Rogerson 1985). In a similar approach I use the spatial distribution of corporate ownership and national affiliations to qualify the extractive network over Treaty 8 territory.

Mapping corporate headquarters and the distribution of corporate ownership provides important analytical avenues. It will enable me to identify national seats of power. Foreign ownership can be identified and countries with a specific interest in the region can be highlighted. The spatial relationships identified can even be compared with the colonial power of

international trade agreements, agreements that have by their nature entrenched neoliberal policies. Mapping ownership and ownership proportions will also enable comparison between the major projects and the core oil and gas company data sets.

The three maps created as well as the affiliated impact estimates, most impacted watersheds, and statistics on the global distribution of corporate ownership can be found throughout this thesis.

Corporate Data Collection

The corporations driving resource extraction are the key actors being studied in this research. The next section outlines why and how companies were selected for inclusion in the analysis and which data was collected. Preliminary data, including the two core data sets are presented. Some of the analytical uses for the data are reviewed before an in-depth discussion of social network analysis and power mapping.

Creating a corporate database

The key resource companies in this research are natural gas extraction companies. However data on an additional industry category of "major projects" was also collected. The two data sets help test the generalizability of findings and characterize major economic investment in the Treaty 8 region of British Columbia. Furthermore, these two industry segments "Major Projects" and "Oil and Gas" are considered the most controversial and are generating the greatest discussion at the provincial level.

The oil and gas data set focuses on the most active oil and gas companies drilling and extracting natural gas on Treaty 8 territory; there are many more companies associated with the energy production chain that are not discussed/assessed here. The focus on one sub-sector of the oil and gas industry helps define the range of impacts associated with the companies being studied, deals with a set of impacts constrained to Treaty 8 territory (within BC), and should result in a relatively homogenous structure for corporate operations, increasing the potential for comparisons. Using a government list of natural gas and oil companies with wells in BC I extracted the 20 companies with the most active and future projects (See Table 1). Only companies with 50 or more active and planned projects were included. I chose to focus on the most active companies as these are companies that are serious about extraction despite low economic

forecasts. Active companies are also the most important companies to focus on from an intervention perspective.

To provide a useful point of comparison with the oil and gas company data set, I collected data on 15 companies proposing major projects. The government of British Columbia keeps a database of "major projects" defined as projects anywhere in the province with a proposed value greater than 15 million dollars. A complete list of major projects by region can be accessed from the BC economic atlas. I chose a subset of major projects excluding downstream activities to natural gas extraction but slated for construction on Treaty 8 territory in BC. These criteria aim to provide an overview of extraction other than oil and gas on Treaty 8 territory in BC, as well as to establish a comparison between different industry segments (oil and gas vs major projects). There were 15 major projects that fit my research criteria, the project details and accompanying corporate details are presented in Table 2.

Analysis of these two data sets offers a comparison of a broad set of industries proposing projects in northeastern BC and may provide useful insights into the ties between different industry segments. The company data sets also allow a characterization of the network of extractive companies and projects in Canada.

Table 1: Core Natural Gas Extraction Companies

Company	**Number of Projects**	**Parent Company?**	**International Headquarters**	**Total Revenue in 2017** (CAD millions)	Notes
Encana Corporation	861	N/A	Calgary, Canada	4,443 (US)	Focusing on condensate production in Montney holdings.
Progress Energy Canada Ltd.	825	PETRONAS	Kuala Lumpur, Malaysia	45,518 RM millions *	Petronas is an important revenue generator for Malaysian government.
Canadian Natural Resources	551	N/A	Calgary, Canada	17,669	Holds the largest undeveloped land base in western Canada.
Shell Canada Limited	530	Royal-Dutch Shell	The Hague, Netherlands	18,929 (US million)*	Primary operator for the Groundbirch natural gas field.
ARC Resources Ltd.	330	N/A	Calgary, Canada	1,122.9	Focusing on liquids rich developments for maximum profitability.
Shanghai Energy Corp.	288	Sinopec	Beijing, China	2,360,193 (RMB million)	Sinopec is one of the largest fossil fuel companies in the world.
Tourmaline Oil Corp.	271	N/A	Calgary, Canada	1,919	Young but aggressive company, initial public offer was in 2010.

Company	**# projects**	**Parent Company?**	**International Headquarters**	**Total Revenue**	Notes
Murphy Oil Company Ltd.	256	N/A	El Dorado, USA	2,097 (US millions)	Exploration focused, but ¼ of their 2016 production came from Canada.
Harvest Operations Corp.	184	Korean National Oil Company	Seoul, South Korea	285.2	Harvest Operations is 2nd largest subsidiary of KNOC by reserve volume.
Crew Energy Inc.	148	N/A	Calgary, Canada	214.2	Montney focused company with significant room to expand its production.
Canbriam Energy Inc.	101	N/A	Calgary, Canada	N/A	680 net drilling locations. Expansion sponsored by private equity firms.
Nexen Energy ULC	95	CNOOC	Beijing, China	186,390 (RMB millions)*	Wholly owned subsidiary of a national Chinese energy company.
Kelt Exploration (LNG) Ltd.	94	Kelt Exploration Ltd.	Calgary, Canada	257.6	Sizeable use of debt to expand operations.
Painted Pony Energy LTd.	93	N/A	Calgary, Canada	434.7	Reduced royalty area gives company a 2.2 million $ royalty credit per well.

Company	# projects	Parent Company?	International Headquarters	Total Revenue	Notes
Polar Star Canadian Oil and Gas, Inc.	74	Teachers Insurance and Annuity Association of America, and the College Retirement Equities Fund	New York City, USA	N/D	Managed by a consulting firm to the TIAAA/CREF called Adastra Management Inc.
ConocoPhillips Canada Operations	72	ConocoPhillips	Houston, USA	29,106 (US millions)*	Sold many western Canadian assets to Cenovus Energy, retained 2billion in Cenovus shares as part of sale.
Pengrowth Energy Corp.	71	N/A	Calgary, Canada	622.0	Company focused on reducing debt load through cash flow and asset sales.
Chinook Energy (2010) Inc.	69	N/A	Calgary, Canada	29.2	Sister company to Storm Resources, in 2017 had only 13 operational wells.
Predator Oil BC Ltd.	67	Private Company	Incorporated in Vancouver, Mail goes to Calgary	N/D	Purchased pipelines from Pen West Energy Corporation
Storm Resources Ltd.	64	N/A	Calgary, Canada	138.6	Formed in 2010 after the sale of Storm Ventures International to ARC Resources.

Table 1: Core Natural Gas Extraction Companies: There are 86 companies with active natural gas and oil wells in BC. Table 1 lists the 20 most active fossil fuel extraction companies operating in BC in 2017. The

number of projects are the total proposed and active projects each company had listed with the provincial government as of summer 2017. Global owners for companies are listed, as is the city and country of each company's global headquarters. A short note on each company highlights some of the qualitative findings of this research.
*The total revenues for wholly owned subsidiaries are not available, total revenues from parent company have been used instead.

Building Company Profiles

In order to provide an in-depth analysis a wide variety of data on each company was collected. The data collected included qualitative data, information on company directors, company headquarters, project locations, company ownership, and financial details. The CMP, Orbis database, Imap BC, company websites, and SEDAR.com were all used as important sources for data collection. This data enables a strategic assessment of core companies, mapping of company ownership, and Social Network Analysis (SNA).

The qualitative data collected helped me to get familiar with the region, the companies working there, and the language used by industry. The preliminary round of qualitative data collection on each of the core oil and gas companies, as well as on the 15 proposed major projects included reading company and project specific websites and government permits as well as industry and NGO reports on the region.

The qualitative company profiles used for assessing each company were flushed out with financial data. Company financial data is helpful to collect for a number of reasons, it can expose company vulnerability to interruptions in its cash flow (eg. from boycotts or blockades), but it can also provide information on how any individual company expands its operations.

All publicly traded companies registered in Canada provide annual and quarterly financial results to comply with securities regulation authorities. These files are kept publicly available through SEDAR. Unfortunately, financial data for private corporations and wholly owned subsidiaries was difficult to find and not consistently available in a useable format.

Using the most recent quarterly reports available at the time of data collection (fall 2017), I was able to collect the operating cash flow, debt-equity (D/E) ratio, and current ratio, for each of the companies being studied. These financial ratios can be compared to reveal a lot of detail about company operations.

The D/E ratio is calculated as the sum of a company's liabilities divided by the total listed share-holder equity (Investopedia, 2018). The D/E ratio is useful to this analysis in two ways. First, it is an indicator of the financial health of a company. A high D/E ratio can suggest a company that is struggling with debt, while a low D/E ratio can indicate a company that is either having trouble financing its activities or is poised to leverage its current position and expand operations. The D/E ratio for each company can also be compared to industry averages available through Statistics Canada. Comparing an individual companies' D/E ratio to the national average can be a good way of comparing the companies health relative to its competitors.

The D/E ratio is similar to one other measure of corporate stability, the current ratio. The current ratio is calculated as "current assets divided by current liabilities" (Investopedia, 2018). The current ratio is important because it demonstrates a companies ability to respond to near-term debt obligations. I have found it useful as it also indicates a companies future direction. Companies with near term debt obligations will seek to re-finance or reduce their debt load. Companies with few current liabilities have significant flexibility with near-term cash.

There were a few barriers to data collection that must be noted here. Due to time limitations and the intensive nature of collecting financial data I have generated a single snap-shot of company financials. This snap shot can provide useful insight into how companies operate but would become more robust if company financials were compiled for multiple years/time steps. Additionally, there remains a gap in collecting the necessary affiliations data for the SNA discussed in the next section. The biggest gap in both the ownership and interlocking directorate networks remains privately held companies. Data on ownership and directorship in many private companies is hard to come by, making it difficult to integrated some of these companies in the larger networks. While I was not able to integrate the privately held companies Predator Oil BC Ltd., Aeolis Wind, Anemos Energy Corp, and Natural Forces Energy Corporation into the networks the qualitative data should still provide useful insights. The "Affiliations, Ownership, and Territorial Influence" section of the discussion relies on an in-depth review of company profiles, including company financial and qualitative data.

Table 2: Major Project Proponents

Company	Project	Project Summary	Estimated Project Cost (Millions)	Company Parent	International Headquarters of Parent Company
Meikle Wind Energy LP	Meikle Wind Energy Project	187 MW Wind Farm	400	Pattern Energy Group	San Francisco, USA
Boralex Inc	Moose Lake Wind Power	15MW Wind Farm	70	N/A	Kingsey Falls, Canada
Aeolis Wind Power Corporation			Boralex to provide financing	Private Company	Sidney, BC, Canada
HD Mining International Ltd.	Murray River Coal	Underground coal mine.	300	Huiyong Holdings (BC) Ltd. (55%); Canadian Dehua International Mines Group Inc (40%).	Vancouver, Canada
ATCO Energy	North Montney Power Supply Project	Electrification of Progress Energy gas field.[4]	N/D	ATCO Group/Stentgraf	Calgary, Canada
BC Hydro	Peace Region Electrical Supply Project	Electrification of natural gas extraction in southern peace region.	N/D	N/A	Vancouver, Canada
Red Willow Wind Limited Partnership	Red Willow Wind Project	200 MW Wind Farm	480	Boralex Inc.	Kingsey Falls, Canada
Zero Emissions Energy Development	Septimus Creek Wind Farm	15MW Wind Farm	50	Anemos Energy Corporation (private)	Hamilton, Canada
BC Hydro	Site C Hydroelectric Dam	3rd major dam in region.	10500	N/A	Vancouver, BC

[4] This project has since been removed from the Major Projects inventory, either due to construction or proponent withdrawal.

Company	Project	Project Summary	Estimated Cost	Company Parent	International Headquarters
Glencore PLC	Sukunka Coal Mine	Open pit mine for coking coal	450	JX Nippon holds a 25% share in project.	St. Helier, United Kingdom
Sukunka Wind Project LP	Sukunka Wind Project	15MW Wind Farm	45	Natural Forces Wind Inc, Private Company	Halifax, Canada.
Zonnebeke Wind Project LP	Zonnebeke Wind Energy Project	15MW Wind Farm (using same access and power lines as Sukunka Wind Project)	45	Natural Forces Wind Inc, Private Company	Halifax, Canada
Innergex Renewable Energy Inc.	Dokie Phase II Wind Power Project	156 MW Wind Farm adjacent to Dokie 1	215	Possible GE affiliation through previous ownership.	Longueil, Canada
Dokie Wind Energy Inc.	Wartenbe Wind Energy Project	70.5MW Wind Farm	140	EDF Energies Nouvelles	Courbevoie, France
Taylor Wind Project Ltd.	Taylor Wind	400 MW Wind Farm	900	EDF Energies Nouvelles	Courbevoie, France
Centerra Gold Inc.	Kemess Underground	Underground gold, copper, and silver mine	603 start up cost	N/A	Toronto

Table 2: Major Project Proponents: Summary data on 15 major projects being proposed for Treaty 8 territory in BC. The proposing companies are presented as are their ultimate global owners and the locations of their global headquarters. Brief project outlines are presented are as the anticipated project costs (in millions).

Social Network Analysis and Power Mapping

Company profiles, geographical location, and interlocking directorates all contribute to a social network analysis of the corporations operating on Treaty 8 territory. This section introduces SNA terms and theory that underlie the discussion and analysis sections.

Social Network Analysis of corporate communities and elite networks is premised on a few central contentions. Corporate directorates, composed of company directors, are the center of corporate decision making. Thus board members are the ultimate decision makers for corporate activity (Carroll, 2004). Company directors and the networks they are imbedded are the strategic center of corporate power.

A director at company A who also holds a directorship with company B creates an interlock, or affiliation, between companies A and B (Carroll, 2010; Carroll & Sapinski, 2011). Companies have multiple directors and through them can have multiple interlocks with other companies. Networks of interlocking organizations provide the transfer mechanism for insider information and are a key component of cohesion between companies. Organizational interlocks can lead to coordinated economic activity and business strategies (Sapinski, 2015; Carroll & Sapinski, 2011). The network of interlocks created by directors with multiple appointments are called networks of interlocking directorates, or inter-corporate networks.

Corporate mapping, or power structure research, uses SNA to map the networks created through interlocking directorates (Carroll & Sapinski, 2011). Companies and company directors are represented in SNA maps as nodes. The links between a director and a company are represented by a line. Combining multiple companies with interlocking directorates creates a network that can be visualized and studied. In this research the two-mode networks created by company-director-company interlocks were compressed using Ucinet into one-mode networks, where all nodes represent companies and the links between them reflect one or more shared directors.

Linkages between companies can be qualified as instrumental or expressive (Brownlee, 2005; Carrol, 2010). Instrumental linkages are those that can help coordinate or exercise economic power. Expressive linkages do not involve exercise of economic power, but lead to shared ideals, ideas, and outlooks among board members. Expressive linkages are more

common, leading to the formation of a class mentality and unified political and social ideologies among corporate directors (Brownlee, 2005). The existence of board interlocks and their expressive and instrumental natures are foundational to understanding cooperation between corporations and the potential outcomes of corporate networks (Carrol, 2004; Brownlee, 2005).

Authors such as Bill Carrol (2004, 2010) and Jamie Brownlee (2005) have used social network analyses to map out corporate networks in Canada and internationally, arguing compellingly that there is an economic elite whose members are closely connected through interlocking directorates. The economic elite are people who hold positions of power in corporations. They may have access to other positions of power or be in power roles outside of their company (Scott (2008) as seen in Carroll & Sapinski, 2011). One of the findings of research on the Canadian economic elite is that they are socially cohesive. Cohesion is a process which leads to shared outlooks or positions across a network. Social cohesion within networks of interlocking directorates, as studied in Canada, creates the conditions necessary for the formation of a class identity (Brownlee, 2005; Carrol, 2010).

Social cohesion leading to elite networks is maintained and articulated through instrumental and expressive connections between company directors. Directors with positions on multiple boards have an incentive to look out for the collective interests of all the companies they work with. Directorates that span multiple industries create incentives for economic success inclusive of each sector (Brownlee, 2005). Thus on boards with many interlocks, class perspectives can emerge that transcend the narrow interests of single companies or sectors (Brownlee, 2005; Carrol, 2010). Furthermore, board interlocks act as a mechanism to extend corporate interests beyond companies and into the discourse used by NGO's and think tanks on whose boards members of the economic elite sit (Sapinski, 2017). Board interlocks are notable because they decrease competition, accelerate the exchange of ideas and information between companies, and help unify industry interests. Ultimately cohesive corporate networks can present unified preferences to government, making their political position much stronger.

The sum of corporate interlocks creates a corporate network. The companies driving extraction on Treaty 8 territory can all be situated in a corporate network through SNA. The board interlocks that compose the corporate network of extractive companies operating on Treaty 8

territory can be combined and assessed using Ucinet. Using the CMP database and my own list of oil and gas companies I created an ego-network of companies operating on Treaty 8 territory. An ego-network starts with the core companies being studied and includes all the companies they are directly linked to through their directors, these companies are called alters. Any links that exist between alters are also included in the ego-network (W. Carroll & Sapinski, 2013; J. P. Sapinski, 2017).

Ucinet has the ability to represent not only the links between companies in a network but also node attributes. Node attributes include categorical data such as the industry sector a company belongs to, as well as discreet quantitative data such as total company revenue. The ego-network can incorporate attribute data on the companies in the network to augment the analytical power of the corporate network map.

The attributes data can help distinguish between the corporate network and clusters of corporations within the network, referred to here as corporate communities. SNA enables the examination and analysis of these communities and the broader network they are a part of. SNA can characterise communities, identifying their relative strength and the types of interests they are likely to foster. The strength of an interlocking community can be gauged by the number of ties between its actors. Interlocking community interests can be predicted under unity theory (Brownlee, 2005). Unity theory suggests actors in highly connected networks are more likely to have shared interests. Unity theory argues for highly connected communities within a network, and can even be used in conjunction with ownership networks to establish company owners with the greatest interest in extraction on Treaty 8 territory.

My analyses of the core companies operating on Treaty 8 territory uses Ucinet to assess the network. It builds from previous work done assessing Canadian and transnational corporate networks. Networks of board interlocks tend to have dense cores and expansive peripheries of less powerful and influential people and companies. The relative position of actors within the network will help clarify which companies may control resource and information flows between other members of the network. Additionally, within the network I will be able to identify communities or groups of actors likely to have common interests. Specific analytical methods are explained in the appropriate results section. This analysis will help answer several questions

about the companies driving extraction on Treaty 8 territory, including: Do the companies display any independence from the primary network of extractors in Canada? What role do sectoral cleavages and interests play in the relationship between different industry sectors? Can we expect different industry sectors to support each other based on their interlinkages?

3. Results

The data and results from the QGIS survey of Treaty 8 territory were included in the context following the research question. The results section opens with a presentation of the analysis of interlocking directorates of the oil and gas company network. Specific calculations and network measurements are introduced along with the results of those analyses. Next, I present an analysis of the ownership data for both the major projects and the oil and gas data sets. The implications of project and company ownership are discussed, as well as the primary corporate interests. Qualitative data is primarily reserved for the discussion, as are some of the social network analyses produced using Ucinet.

The Treaty 8 Natural Gas Extractive Network

A social network analysis of oil and gas companies operating on Treaty 8 territory provides valuable insights into the industry and individual corporate actors. In this section I analyze two types of networks for the core oil and gas companies in this study: a network of interlocking directorates and an ownership network. Analysis of both networks sheds light on corporate power and can provide explanations for corporate behaviour. The first analysis presented is the network of interlocking directorates for the core oil and gas companies being studied.

Affiliations between organizations, especially those that can lead to increased cooperation between companies, rely on directorship links between companies. The members of large networks however can display shared characteristics and goals well beyond the influence of any single set of interlocks (Brownlee, 2005; Sapinski, 2015). Because I am focused on a subset of 20 oil and gas extractors on Treaty 8 territory I want to generate data and commentary on their role within their immediate network, roles that are more dependent on relationships between companies rather than emergent network cohesion. In order to study the relationships between the core companies I extracted an ego-network from the Corporate Mapping Project (CMP) database of fossil fuel companies in Canada (Fig. 2).

Notably, the ego-networks of the core-companies all interlock, not one company was left without ties to the others. Thus the network forms a single component, meaning that all the fossil fuel companies studied and their alters within the ego-network form part of one large corporate

network. That all the nodes are part of a connected ego-network speaks to the unity and integration of the corporate community in Canada.

SNA can also provide powerful insights into actor roles and position in a larger network. A nodes relative power or influence within a larger network is measured through its centrality. Degree centrality is the most basic measure of centrality, counting the number of ties connecting one node to those directly around it (Sapinski, 2015). Beta-centrality expands on degree centrality by accounting for the linkages of surrounding nodes, so a node with well-connected neighbours receives a higher score than a node with poorly connected neighbours. Beta-centrality differs from other centrality measures because it uses a parameter (beta) to reflect the researcher's assumptions about how far node influence extends (Bonacich, 1987). A low beta parameter suggests that node influence is limited to its immediate connections, while a high beta parameter takes into account the nodes position in the larger network (Bonacich, 1987). Beta-centrality is a useful measure of integration and influence across an entire network (Bonacich, 1987; Sapinski, 2015).

I have used beta-centrality as a means of comparing the ego-network of my core oil and gas companies with the Corporate Mapping Project database. The CMP database is a comprehensive list of fossil fuel companies operating in Canada, the companies they are linked with through interlocking directorships, and a third wave of companies that share directors with the linked companies (Carroll, 2017). The CMP database is a comprehensive corporate network of the Canadian fossil fuel industry for the years 2015 and 2016. Comparing the ego-network of the 20 most active fossil fuel extractors in the BC region of Treaty 8 territory to the broader database enables me to situate these companies within the national corporate network. The beta-centrality scores for each company in the ego-network of Treaty 8 extraction were calculated from the complete CMP database. Because the CMP database represents a complete network I am able to use the beta-centrality measures calculated for direct comparisons between nodes in the ego-network without favouring the core companies used to create the ego-network.

Using beta-centrality as a measure of influence I have classified the network influence of actors into 7 brackets with the lowest influence actors having a score of less than 50 and the most influential actors having a score greater than 500. Furthermore, using the complete CMP

database also enables comparisons between the national fossil fuel network and the ego-network of extractors operating on Treaty 8 territory. Table 3 presents the summary results of the Beta-Centrality measures, additional data can be found in Table 4 and in Table 17 (appendix B). The beta-centrality score will allow me to assess the influence and integration of individual companies in the ego-network as well as make comparisons with the national corporate network.

Table 3: Summary of Beta-centrality Results

	Bracket categories for Beta-Centrality Score	Number of Actors per Bracket – CMP data	Percentage of total	Number of Actors per Bracket - Ego-network	Percentage of total
1	0-50	1127	67.5	124	58.8
2	51-100	349	20.9	51	24.1
3	101-200	146	8.7	29	13.7
4	201-300	26	1.5	4	1.9
5	301-400	11	0.7	2	0.9
6	401-500	6	0.4	1	0.4
7	500+	5	0.3	0	0
Totals		1669		211	

Table 3 presents the beta-centrality scores for both the entire CMP database and the ego-network being studied here. There are 7 brackets established using the CMP dataset. The higher the beta-centrality score the more influential a company is over their neighbours. Over 80% of companies fall in the first two brackets (Beta centrality score < 100). Companies in the most populated brackets are unlikely to hold special roles within the network.

The ego-network of the 20 core oil and gas companies has 211 member companies. The ego-network was assessed using a few community composition algorithms and the Girvan-Newman analysis provided the most interesting results. A Girvan-Newman community analysis

looks for communities within a social network by removing edge nodes with high betweenness[5] scores from the network (Girvan & Newman, 2002). The analysis is iterative and can create as many communities as are specified by the researcher. I tested for up to 20 communities; a six cluster solution provided the most explanatory power. The resulting 6-cluster analysis has provided a number of insights into possible segments of the corporate community on Treaty 8 territory. The communities are visually depicted in Figure 2. The community that each core company belongs to are listed on Table 4, and Chi-squared tests for significant differences in attributes between the communities can be found in Appendix B.

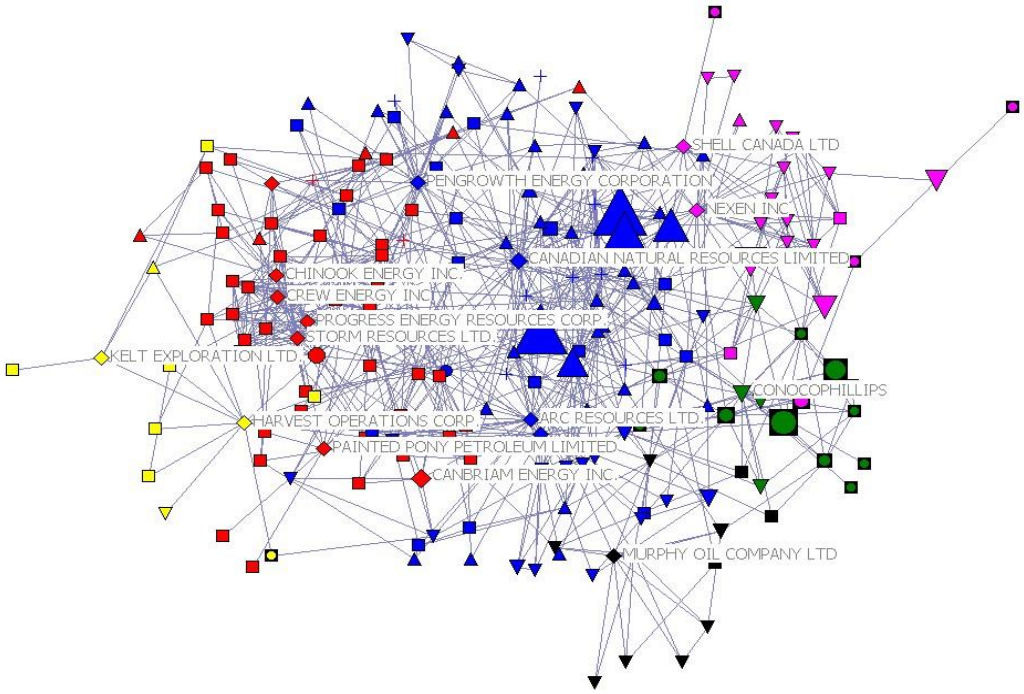

Figure 2: Inter-corporate Network of Natural Gas Companies

Figure 2: An ego-network of the most active publicly traded oil and gas companies operating on Treaty 8 territory during 2017. The core companies are labelled on the map. The colours represent corporate communities identified through a Girvan-Newman analysis. The node shapes represent industry classifications, with diamond shaped dots being the core-sample companies. The relative size represents the total assets of each company.

The communities identified by the Girvan-Newman analysis are useful in describing and characterising the ego-network of board interlocks. Each community identified by the Girvan-

[5] Each node receives a betweenness score based on how many other nodes are connected exclusively through it. Nodes with high betweenness scores create bridges between different communities (Girvan and Newman, 2002).

Newman analysis has at least one publicly traded core company in it. The communities potentially represent social units with distinct levers and points of influence. The two largest communities are the “linking” community in blue with 91 members and the “Canadian Juniors” community in red with 59 members. The “ Conoco and co” community in green has 15 members, the “Peripheral extractors” community in yellow has 11, the “Murphy co.” community in black has 12, and the “Multinational” community in pink has 25 members. Each community has been named for one of its defining characteristics. The distinctiveness of each community can be further established using chi-squared distribution tests. Categorical data were available through the CMP data base and my own research. A chi-squared distribution test compares the distribution of categorical data in one group with the anticipated norms for that sample size based on the distribution of categorical data in the entire data set. Using a chi-squared distribution test I compared the Girvan-Newman communities based on the industries that member companies participate in and whether the communities were dominated by specific national interests.

The “Linking” community, blue in figure 2, is the largest interlocking community in the ego-network and un-surprisingly the chi-squared tests revealed that the community composition of the Linking community does not deviate significantly from the entire ego-network composition. Importantly for the linking community however is the dominance of Canada’s largest financial corporations. The upward pointing triangles represent companies in the finance and banking industry, and the size of the symbol represents the total assets of those companies. The linking community is dominated by these large financiers. The observation that the financiers are dominant within the network is bolstered by their beta-centrality scores (Table 17 Appendix B). TD bank (beta-centrality score of 113.85), CIBC (beta-centrality of 114.15), and Bank of Nova Scotia (beta-centrality of 128.7) are all part of the linking community and have higher centrality scores than any of the core companies in this study. The linking community also includes the most established independent oil and gas companies in Canada: Canadian Natural Resources (CNRL), Encana, ARC Resources, and Pengrowth Energy. From my qualitative research each of these companies considers themselves as a diversified and independent energy producer focused primarily on Canada. CNRL has the largest holdings of undeveloped oil resources in

western Canada, while Encana is the country's largest producer of natural gas (CNRL, n.d.; Encana, n.d.). Given the community composition we would expect extractors in the linking community to be well financed and connected to the center of the national oil and gas extraction network.[6]

The chi-squared tests revealed that the "Canadian Juniors" community, red in figure 2, is statistically different from the linking community and ego-network. First, the companies linked to each other in the Canadian Juniors community are predominantly Canadian, this is a significant difference from the network mean ($p<0.01$, Table 11 Appendix B). This community of companies also has the highest count of core companies of all the clusters (7). As can be seen from figure 2 Progress Energy, Storm Resources, Chinook Energy, and Crew Energy Resources are part of a dense core within this community. This group is also notable because the companies are predominantly oil and gas extractors, and with far fewer interlocks with manufacturing companies than would be expected ($p<0.01$, Table 12 Appendix B). The core companies in the Canadian Juniors community are mainly extractors and often do not own the transportation and processing infrastructure associated with larger and more vertically integrated resource extractors.

The "Conoco and co" community, green in figure 2, is distinguished by its nationality. The companies in this community are dominated by American companies ($p<0.01$, Table 13 Appendix B). The prominent core company is ConocoPhillips, the world's largest independent oil and gas extractor (ConocoPhillips 2017). The ConocoPhillips ownership network is similarly dominated by US and international interests, suggesting that it is a company with few ties to Canada other than its resource extraction rights. The chi-squared assessment of the Conoco and co. community also revealed strong industry patterning, this time however the group is dominated by manufacturing firms with few links to other oil and gas extractors ($p<0.01$, see table 14 Appendix B)[7].

The "peripheral extractors" community, yellow in Figure 2, does not have any statistically significant deviations from the ego-network means in either its industry composition or the nationality of the companies in the network. Of these companies only 1 company has a Beta-

[6] These conclusions are reflected in a recent study of the complete CMP dataset (Carroll 2018).

[7] The industry classifications for the companies were taken from the CMP database that had the NACE codes for each company. The list of industries and their codes is in the legend for Table 12 (Appendix B).

centrality score above the lowest influence bracket. The lack of high-influence actors in this community suggests that this group of companies is unlikely to influence other communities within the ego-network (see Fig. 2). The most influential actor in the cluster is a possible power broker for the community.

The "Murphy co." community, black in Fig. 2, is dominated by American interests (Table 15 Appendix B). Much like the Conoco and co. community, the Murphy co. community is dominated by a large independent oil and gas extractor (Fig. 2). Murphy Oil is a fairly senior oil and gas company, which primarily focuses on exploration and development. However, they are heavily dependent on their Canadian operations, in 2016, 26% of their net production came from Canada. Murphy oil is heavily invested in its Canadian operations but remains distant from the national industry networks and is controlled by American investors (Table 5).

The "multinational" community, pink in Fig. 2, belongs to foreign national networks beyond North America ($p<0.01$, Table 16 Appendix B). The dominant companies include Shell and CNOOC through its ownership of Nexen. Nationally owned oil companies such as China's CNOOC and Sinopec are becoming increasingly important players in the extraction and sale of fossil fuels globally (de Graaff, 2011). Nana de Graff (2011) notes that nationally owned oil companies are increasingly linking with international oil companies such as Shell. It is not surprising to find those companies in the same sub-community of the ego-network. Additionally, the multinational community is very influential within the network. Of the 27 companies only 10 are in the lowest influence bracket while seven are among the 20 most influential companies of the ego-network (Table 17 Appendix B). In a network where over 82% of the companies have a beta-centrality score in the two lowest influence brackets having seven members in the third, fourth, and fifth influence brackets suggests that though the multinational community may be a small part of the network they are likely to be able to exert significant influence. Additionally, when compared to the national network the ratio of highly influential to low influence actors remains skewed in favour of the multinational community playing an influential role within Canadian fossil fuel extraction. This conclusion suggests that while fossil fuel extraction in Canada is dominated by national companies and actors (Carroll, 2017) the influence of international companies and actors should not be discounted.

Table 4: Data from Inter-corporate Network of Natural Gas Companies

Company	**Girvan-Newman Community**	**Approximate Debt/Equity Ratio[8]**	**Size of Ego-Network**	**Beta-centrality Measure[9]**
Encana Corporation	Linking	1.18	26	54.6
Progress Energy Canada Ltd.	Canadian Juniors	0.11	8	54.8
Canadian Natural Resources	Linking	1.32	32	112.6
Shell Canada Limited	Multinational	1.18	12	54.4
ARC Resources Ltd.	Linking	0.67	26	59.4
Shanghai Energy Corp.	Multinational	0.75	-	SINOPEC Sales: 3.1
Tourmaline Oil Corp.	Canadian Juniors	0.37	7	27.6
Murphy Oil Company Ltd.	Murphy co.	1.05	10	72.2
Harvest Operations Corp.	Peripheral Extractors	18.1	12	40.1
Crew Energy Inc.	Canadian Juniors	0.62	17	36.1
Canbriam Energy Inc.	Canadian Juniors	N/D	7	16.4
Nexen Energy ULC	Multinational	0.68	27	102.4
Kelt Exploration (LNG) Ltd.	Peripheral Extractors	0.48	4	17.3
Painted Pony Energy LTd.	Canadian Juniors	0.74	9	37.0

[8] The D/E ratio calculations are approximate and use data from the 3rd quarter of 2017. In some cases the D/E ratio of a parent company is shared (eg. Nexen, Progress Energy) and in others D/E has been substituted for another assets to obligations ratio based on available data.

[9] Calculated for the entire CMP database of 1650 companies using Ucinet. I used the Ucinet standard beta for the calculations.

Company	Girvan-Newman Community	Approximate Debt/Equity Ratio	Size of Ego - Network	Beta-centrality Measure
Polar Star Canadian Oil and Gas, Inc.	-	N/D	-	Privately held by Teachers Insurance and Annuity Association of America
ConocoPhillips Canada Operations	Conoco and Co.	1.44	21	90.2
Pengrowth Energy Corp.	Linking	1.61	23	54.0
Chinook Energy (2010) Inc.	Canadian Juniors	0.49	12	33.8
Predator Oil BC Ltd.	Linking	N/D	-	-
Storm Resources Ltd.	Canadian Juniors	0.39	18	38.1
Network Wide Scores:		National Average: 0.730[10]	Average network size 8.02	

Table 4: *Data from Inter-corporate Network of Core Natural Gas Companies:* Listing the 20 most active oil and gas extraction companies in BC in 2017. Table 4 expands on earlier data for these companies. For each company their Girvan-Newman community is listed. Next the approximate debt/equity ratio for each company is shared. Each company's K-core score is shown to justify the Girvan-Newman analysis. The size of each ego-network will be used in discussing individual company cases, while the Beta-centrality score can be used as a rough measure of influence and connectivity within the national corporate network (Sapinski 2015).

Along with corporate communities table 4 lists the debt equity ratio of the core companies. The D/E ratio, among other financial ratios, can shed light on company financial practices and enables a comparison with the rest of the industry. Interestingly few of the core companies are close to the national average D/E ratio (0.73, Table 4). D/E ratios above the national average suggest companies that are either struggling with too much debt or have recently taken on new debt to expand their operations. D/E ratios below the national average

[10] Statistics Canada 2016

suggest companies that are between investment cycles or are self-financing. The D/E ratio for each company will be explored more in the analysis of the core companies.

The last element of table 4 worth mentioning is the Beta-centrality score. As previously discussed the beta-centrality score offers a measure of actor influence and connectivity within the network. Importantly the beta-centrality score offers a means of comparing the ego-network with the Corporate Mapping Project's oil and gas extractive network in Canada. Using seven brackets I organized actors from lowest to highest influence (Table 3). The bracket ranges are 0-50, 50-100, 100-200, 200-300, 300-400, 400-500, 500 +. If we remove the 5 actors whose centrality score exceeds 500 then the mean beta-centrality score for the national network is 49.99 while the mean beta-centrality score for the ego-network is 68.2, suggesting that the companies affiliated with extraction on Treaty 8 are well integrated into the national network and may even enjoy more clout than other interest groups in the network. There are 194 companies in the national fossil fuel extractive network that have a score greater than 100, 36 of those companies are part of the ego-network. Companies with a higher beta-centrality score have more influence within the extractive network and should be considered central actors in shaping extraction in Canada. Interestingly the companies from the ego-network with the highest beta-centrality score are not the core companies used to build the ego-network (Table 17 Appendix B).

Beta-centrality has been used to estimate the importance of an actor or company in mediating relationships and sharing ideas within a network (Sapinski, 2015; Carrol & Sapinski, 2011). The ego-network of extractive companies is slightly more influential and connected than the averages for the national network, suggesting that companies operating on Treaty 8 territory are well integrated into the national network of extractive companies. It is important to note that fossil fuel companies are not the most connected actors in the ego-network, but that they do dominate some corporate communities (e.g. Canadian Juniors). Additionally, however, there are significant differences in influence between the various corporate communities within the ego-network. The variations in beta-centrality scores between communities has strategic implications that will be touched on later. Lastly, company affiliations are only one of the mechanisms leading to cooperation between corporations and cohesion within the corporate class. Ownership

interests, as an expression of allocative power that can lead to control over strategic and operational power as well, are also an important force for corporate unity (Brownlee, 2005).

Ownership Networks on Treaty 8 Territory:

Corporate ownership networks are directed networks representing power affiliations, where resource and information flows between connected actors are related to the position of that actor in the relationship (Brownlee, 2005). Linking companies operating on Treaty 8 territory with their global ultimate owners and major shareholders reveals power brokers, central actors, and can draw comparisons between inter-corporate networks and the exercise of allocative or operational power. Ownership links also reveal the ultimate beneficiaries of extractive activities.

Publicly traded companies have a fiduciary responsibility to maximise the profits of their shareholders. Importantly, state owned companies such as Petroliam Nasional Berhad (Petronas) and CNOOC Ltd are expected to provide the same outcomes to their national owners. The companies and individuals that own the extractive companies operating on Treaty 8 territory are principally interested in the profits generated from that extraction. We expect corporate owners to exercise influence primarily to boost profitability, and to react negatively to threats to profitability (Davis, 2008).

Ownership of Oil and Gas Extractors

In this study I have focused on 20 core oil and gas companies. 19 of these are publicly listed or are wholly owned subsidiaries of major oil and gas companies from across the world. In total there are 471 ownership links to the 19 companies. 36.7% of the links are within Canada, 39.5% are in the USA while the remaining ownership links are distributed globally (Table 9, Appendix A). Table 5 highlights the largest shareholders for each of the 19 companies as well as their country of origin. The percentage of foreign versus national owners for each company is also provided.

Ownership shares can enable companies to select the directors of the companies they control, potentially shaping the web of interlocking directorships. Capital control over a company can even lead to partial or total control over company operations such as investments, decisions around growth, and even asset sales. In some instances, ownership shares as small as 5% can be

sufficient for a shareholder have effective control over a company (Brownlee, 2005). Effective control of a company is possible with a small percentage of a company's shares when other ownership interests are very diffuse or passive (Davis, 2008). Diffuse owners are not able to control enough votes to affect a company's board of directors, while passive owners are disinterested in company management and are more likely to exit an ownership position than to vote or influence company governance (Davis, 2008).

Figure 3 shows the global distribution of ownership interests in the core oil and gas companies being studied. The companies labelled all control at least 5% of the companies they are affiliated with.[11] ConocoPhillips, not labelled on the map because it is directly involved on Treaty 8 territory and not an owner of an extractive company, is at the centre of the lines converging on the south-east united states. ConocoPhillips is the largest independent oil and gas producer in the world and has ties to many large institutional and private investors. Notably they are the core company with the most foreign ownership ties. The section on board interlocks, ownership, and territorial influence compares the vertical national and international ownership ties with the lateral ties from the affiliations network previously outlined. Comparing ownership networks with networks of board interlocks enables contrasts based on respective network interests and apparent mechanisms of power.

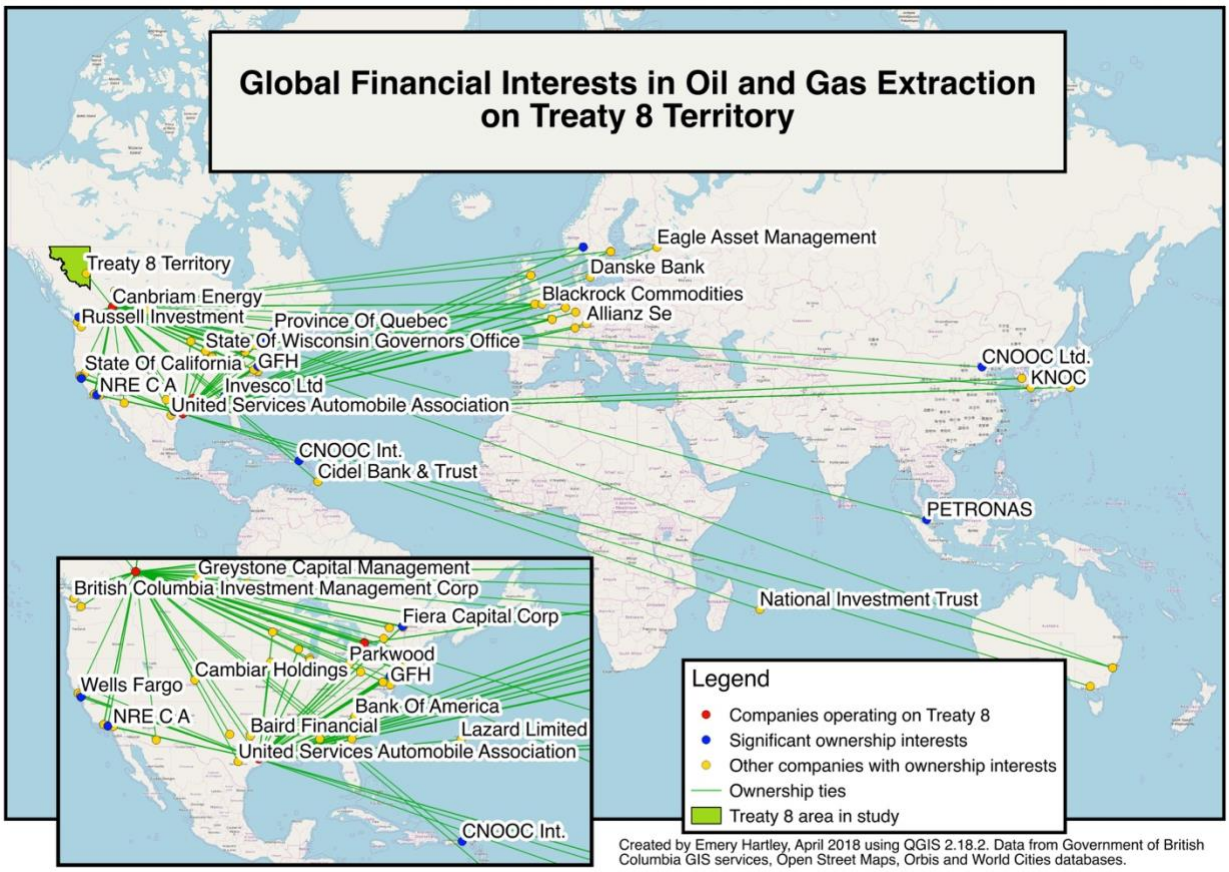

Figure 3: Global Financial Interests in Oil and Gas Extraction on Treaty 8 Territory

The "Global Financial Interests in Oil and Gas Extraction on Treaty 8 Territory" map shows the geographic distribution of ownership interests directing extraction on Treaty 8 territory. The red dots are the corporate headquarters of the 20 most active gas extraction companies operating in 2017. The green lines link these centers of extraction to their domestic and foreign owners, whose headquarters are marked off with yellow and blue dots. Almost all extraction in Treaty 8 territory is mediated through Calgary with only a few operations mediated from Toronto and Texas.

There are a number of companies that have a single owner (Table 5). Many single owners are state owned companies. The acquisition of Nexen by China's CNOOC Ltd garnered national headlines as it represented an important acquisition of Canadian oil and gas assets by a company owned by a foreign nation. Ultimately the Canadian state retains the ability to regulate these companies, but we could expect them to behave differently than private companies when faced with public pressure or difficult market conditions. State owned companies often have access to state financing for major projects and can receive state subsidies to survive tough market conditions. In some cases, states are more interested in access to the resource than the cost of

extraction. State affiliated single owners should be considered separately from other single owners such as institutional investors.

For example, both Polar Star and Canbriam Energy are held by institutional investors. Institutional investors are understood here as pension funds and other actively managed collective financial pots. These institutional investors such as the Teachers Insurance and Annuity Association of America represent thousands of pensioners. While pensioners are regularly considered hands off investors there are democratic controls built into some of these institutional investors. Organizing membership to influence investment policy could lead to significant shifts in the way companies are managed.

Table 5: Global Ownership of Oil and Gas Assets

Company Name	**Number of Publicly listed Shareholders**	**% Canadian Ownership**	**% Foreign Ownership**	**Country of largest shareholder**	**Name of largest asset holder**
Shanghai Energy Corporation	1	0	100	China	SINOPEC (100%)
Nexen	2	0	100	China	CNOOC Ltd. (100%)
Progress Energy	1	0	100	Malaysia	Petronas (100%)
Canadian Natural Resources Limited	76	34.2	65.7	USA	Capital Research Global Investors (11.7%)
Pengrowth Energy Corporation	25	52	48	Canada	Mr. Schulich (19.7%), Nevada Capital Corp. (14.8%)
ARC Resources Ltd.	39	53.8	46.1	Canada	RBC Financial and RBC Global Asset Management US Inc. (combine for 11.1%)

Company Name	# of Shareholders	Canadian Ownership	% Foreign Ownership	Country of shareholder	largest asset holder
Crew Energy Inc.	32	50	50	USA	T Row Price Group Inc. (12.8%)
Painted Pony Energy Ltd.	21	52.3	47.6	Canada	Connor, Clark, and Lunn Financial Group Ltd. (8.4%)
Chinook Energy Inc.	8	62.5	37.5	Canada/USA	Province of Alberta (10%), Franklin Resources Inc. (7.5%)
Tourmaline Oil Corp.	42	40.5	59.5	USA	Capital Group Co Inc. (14.5%)
Storm Resources Ltd.	21	80.9	19.1	Canada/USA	Caisse de depot et placement du Quebec (12.4%), Franklin Ressources Inc. (10.6%)
Kelt Exploration Ltd.	30	63.3	36.7	USA	T Rowe Price Group Inc. (4.9%), Franklin Resources Inc. (0.4%)
ENCANA Corporation	64	29.7	70.3	USA	Davis Select Advisors LP (10.5%)
Shell Canada PLC.	2	0	100	UK, Netherlands	Various Shell parent companies.

Company Name	Number of Shareholders	% Canadian Ownership	% Foreign Ownership	Country of largest shareholder	Name of largest asset holder
ConocoPhillips	99	5.1	94.9	USA	Vanguard Group Inc. (7.8%)
Canbriam Energy Inc.	4	75	25	USA	Warburg Pincus LLC (100%)
Polar Star Canadian Oil and Gas Inc.	1	100	0	USA	Teachers Insurance and Annuity Association of America & the College Retirement Equities Fund (100%)
Murphy Oil Corporation	1	0	100	USA	Murphy Oil Corporation (50%)
Harvest Operations Corp.	1	0	100	South Korea	Korea National Oil Corporation (100%)

Table 5 - Global Ownership of Oil and Gas Assets: 19 of the 20 most active companies in 2017 have publicly listed shareholder information. The number of shareholders reveals companies that have single owners. For companies with multiple shareholders, the larger the number of investors the more likely that the largest asset holder can exercise effective control over corporate decisions. The column with the largest asset holder includes the percentage of shares controlled by that asset holder.

Major Project Ownership

Our understanding of corporate ownership networks across Treaty 8 territory can be enhanced by analyzing the ownership networks of other extractive activities. The major projects database (Table 2) shows a subset of the projects being proposed for Treaty 8 that require more than 15 million dollars in investment. As previously noted, the major projects selected for this study exclude natural gas transportation systems and affiliated infrastructure. Part of the reason to assess companies not directly related to the extraction and sale of natural gas on Treaty 8

territory was to try and create similar data sets for comparison without too much inherent industry overlap.

The ownership of major projects is strategically important to local actors for a number of reasons. Major projects can represent significant financial investments in a region, presenting economic opportunity but also major corporate clout. The investments tend to have long time horizons, shaping regional economies for years to come. Major projects are also inherently expensive, so the companies making investments expect significant returns over a project's life. Due to long time horizons and expected returns once a project is installed, they are unlikely to be easily decommissioned. Understanding major project ownership will help untangle the project drivers and influence of these projects in the region.

Many of the major projects being proposed are covered by limited partnerships that have been solely created for the project. For those projects I found information on 13 independent companies proposing the 15 major projects selected for this study (Table 6). Eight of these companies are publicly traded or wholly owned subsidiaries of publicly traded companies. There were 263 ownership ties to these 8 companies, and 183 unique shareholders. Thus 30.4% of the ownership ties create links between projects. 20.5% of the owners are listed in Canada, while another 43% are listed in the USA. The remaining 36.5% are distributed across another 18 countries. The global distribution of these capital interests in major projects are visible in Figure 4.

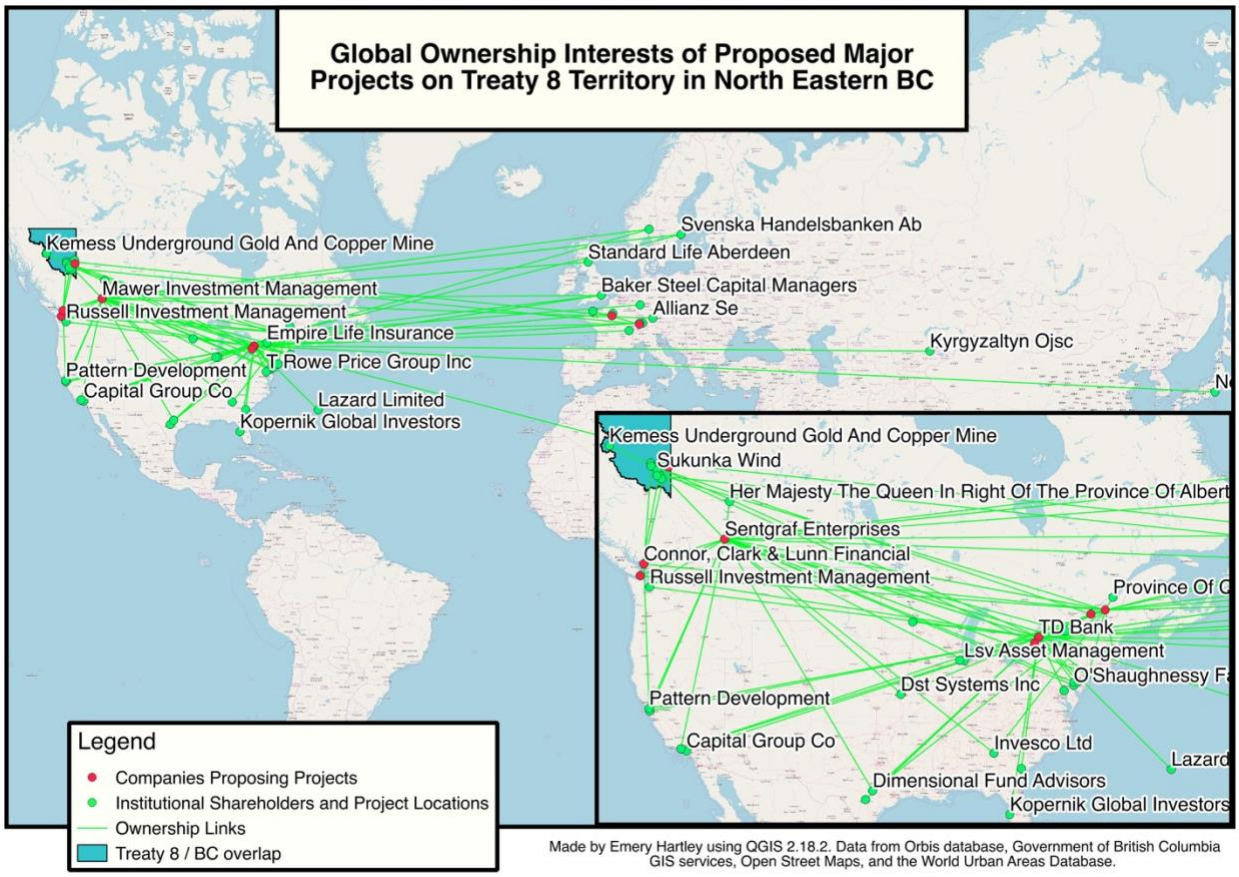

Figure 4: Global Ownership of Proposed Major Projects on Treaty 8 Territory

This ownership map shows the global distribution of ownership interests in the major projects proposed on Treaty 8 territory in BC. The data was restricted to projects that are not directly related to fossil fuel extraction, though two projects proposed by BC Hydro and ATCO energy are primarily geared towards electrifying natural gas pumping and compression stations. There are 13 direct owners of projects in BC (red dots), but 183 indirect ownership interests (light green dots outside of the Treaty 8 region).

Interestingly there are clear foreign direct owners proposing many of the major projects (Red dots in Figure 4). This differs from the oil and gas network, where well ownership predominantly flows through Calgary. Additionally, unlike the oil and gas ownership network, foreign ownership does not have significant sole-ownership interests. Particularly state ownership in major projects is generally in a minority investment capacity. One example is Centerra Gold. The 26% ownership stake by the state of Kyrgyzstan links to the company's operations in Kyrgyzstan, and it is questionable that such an ownership stake would be used to influence extraction in other countries (Table 6).

Other interesting major shareholders in this network are public sector pension groups. As in the oil and gas network pension funds represent significant capital investors that could be influenced by member action and public pressure as they hold more than just financial responsibility to their constituents. “La Caisse de depot et placement du Quebec” is an investment firm that manages funds from over 40 public sector groups in Quebec, including the provincial government pension plan. They have significant holdings in two renewable energy companies proposing projects on Treaty 8 territory. The pension group could dramatically influence projects on Treaty 8 should it choose to use its “voice” (Davis 2008; Pineault & L’Italien, 2012)[12].

Despite having chosen companies not directly related to natural gas extraction in Treaty 8 territory, most of the major projects (Table 2) are in some ways tied to that industry. The plethora of energy production projects are at least partially fuelled by the anticipated demand to electrify natural gas extraction, compression, and transportation processes (Aeolis 2017). The two power lines proposed by ATCO energy and BC Hydro respectively are both expressly tied to the electrification of natural gas fields. Additionally, all the projects being proposed that are not related to electricity production or transportation, are resource extraction projects. Coal extraction is a prominent feature of the economy on Treaty 8 territory, and HD Mining and Glencore are both important examples of that economy. HD Mining’s proposed Murray River Coal garnered significant backlash for the company’s decision to hire Chinese labourers during the initial mine construction (Stueck, 2018).

An important feature of the major projects network is the large number of private players. While only a few of the oil and gas companies in the core sample are private, several of the most active wind companies in BC are private. Aeolis Wind, Anemos Energy, and Natural Forces are each participants in multiple wind farm proposals. Importantly the wind-industry in BC is being driven by sites with less than 15MW of production. Small energy projects cost less and are more approachable for private energy producers. Larger energy producers such as “Électricité de France Energie Nouvelle” (EDF EN) do not have such small energy projects in their portfolio. The

[12] Davis uses the term “Voice” to encapsulate shareholder activism and other influence exercised by shareholders through their ownership stake in a company.

plethora of small wind farms being proposed is a response to BC Hydro's standing offer program, where BC hydro annually accepts upwards of 100MW of new power from power stations generating 15MW of energy or less.

There are a number of large wind-farm proposals with approved environmental assessment certificates. However, they have to wait for BC hydro to put out a call for power large enough for those projects to receive an energy purchase agreement. Energy purchase agreements (EPAs) are contracts between the provincial power authority and a private energy supplier to provide a pre-determined quantity of energy at a fixed price. EPA's are an important part of the business model for companies like Boralex, who almost exclusively develop energy projects under contract (Boralex, n.d.). The standing offer program from BC hydro represents a reliable source of EPA's, resulting in some companies splitting previous projects into smaller, 15MW proposals.

A prime example of project splitting are the two projects being proposed by Zero Emissions Energy Development (Table 2). These two projects share a single access road, ridge line, and power line to the main grid, but are owned by separate limited partnerships. The last point of note on the 15MW wind projects is that the provincial government has waved the need for energy projects producing less than 50MW of energy to go through an environmental assessment in BC ("B.C. Reg. 370/2002," 2016). There is a real danger that the EPA policy and reduced assessment requirements are combining to attract a rush of investment in wind energy without proper assessment of the cumulative influence on the landscape (Rodman, 2013).

The major projects present an important dimension of corporate activity and extraction on Treaty 8 territory. The projects represent significant economic investment in the region, while the breadth of industries present reflects Treaty 8 as a commodity frontier of global extractivism. The nature of project ownership and the mix of publicly traded and private companies provides an important caveat for these major investments. Ultimately however there are important overlaps between the types of economic investment on Treaty 8 territory. The companies selected in the major project and oil and gas networks can be compared to provide insights into extraction in the region.

Table 6: Global Ownership of Major Projects

Company Name	Number of Shareholders	% Canadian Ownership	% Foreign Ownership	Location of Largest Shareholder	Name of Largest Asset Holder
Meikle Wind Energy LP – Fully owned by Pattern Energy Group	85 shareholders for Pattern Energy Group	13	87	Montreal, Canada	Public Sector Pension Investment Board (9.9%)
Boralex Inc	31	61	39	Montreal, Canada	Caisse de depot et placement du Quebec (17.3%)
Aeolis Wind Power Corporation	Private Company	100	-	Victoria, Canada	-
HD Mining International Ltd.	2	100	0	Vancouver, Canada	Huiyong Holdings (BC) Ltd. 55%
ATCO Energy	34	41	59	Calgary, Canada	Sentgraf Enterprises Ltd (84%)
BC Hydro	Public Utility Company	100	-	Vancouver, Canada	-
Zero Emissions Energy Development	Private Company	100	-	Hamilton, Canada	Anemos Energy Corp. (Private owner)
Glencore PLC	66	3	97	Qatar	Qatar Holding LLC (8.49%)
Sukunka Wind Project LP (Natural Forces)	Private Company	100	-	Halifax, Canada	-
Innergex Renewable Energy Inc.	1	100	0	Montreal, Canada	Caisse de Depot et Placement du Quebec
Dokie Wind Energy Inc. (EDF EN)	2	0	100	France	Electricite de France

Centerra Gold Inc.	43	16	84	Kyrgyzstan	Kyrgyzaltyn OJSC (26.6%)
Totals	263 instances of Ownership	20 Countries represented in network.			
	183 unique share holders	54 Canadian companies	114 US companies		

Table 6: Major Project Ownership: Summary of major project ownership. Table 2 outlines 15 major projects proposed in BC. These 15 projects are linked to 13 parent companies. Table 6 outlines which companies are public or private, the number of shareholders each company has, its relationship to its parent company, the composition of ownership interests, and the country of origin of the largest shareholder.

4. Discussion of Findings

The discussion synthesizes the findings of this research and flushes out the potential of combining corporate and power mapping. The discussion is augmented by inclusion of qualitative data gathered throughout the research process. There are three sections. First an in-depth review of ownership, why it matters, the implications of transnationalism and neoliberalism for territorial control, and an attempt to group ownership interests. Next the affiliations and ownership networks are compared in the context of some qualitative findings. The forms of corporate power are used to contextualize the comparison of the networks. Lastly I try and tie the results of this corporate power map back to the context of colonialism and Indigenous resurgence.

The Implications of Ownership

Ownership in both the major projects and oil and gas inventories is internationally distributed. International ownership has many implications for extractive projects in Canada. As previously discussed we care about ownership for its power implications and because of each company's fiduciary obligation to its shareholders. The power of ownership can be exercised in a few ways. First there is active power assertion with owners giving marching orders to management. Active power is usually exercised by companies with majority or controlling minority positions within a company (Scott, 1997). Second there is passive power, where management tries to please owners and financiers based on anticipated desires. Passive power is common when there are more diffuse "constellations of ownership" and management wants to avoid conflict with shareholders' perceived interests (Scott, 1997). Constellations of ownership imply that there are interest groups among the diffuse company owners who could potentially cooperate to exert control over a company. Lastly of course there is the financial power of ownership. Shareholders with significant ownership shares have the ability to sell and devalue a company stock, thus the willingness to enter or exit an ownership position is a key element of modern financial capitalism (Davis, 2008). Shareholders can also choose to purchase new shares and finance new projects. The financial power wielded by investors and owners, whether active or passive, is a key determinant in corporate management decisions (Scott, 1997).

These implications of ownership take on additional importance when attributed to international companies. Bill Carroll (2010) explores the trans-nationalization of Capital. He notes that trans-national capital has been promoted in global trade agreements and by international trade and finance organizations. Since the 1970's, the globalization of trade and of capitalist economies has focused on protecting the interests of foreign companies and investors (McCarthy, 2004). Organizations such as the World Trade Organization (WTO) and agreements such as the North American Free Trade Agreement (NAFTA) aim to "provide investor confidence" by harmonizing labour and environmental regulations between countries and creating dispute resolution mechanisms favourable to international investors (Ackerman et al., 2018). The globalization of rules governing corporations and the trans-nationalization of capital work in tandem.

Countries participate in trade agreements and multi-lateral organizations such as the WTO because they are seen as powerful tools for boosting national GDP. However, most trade agreements and trade organizations also require countries to negotiate away aspects of their sovereignty (Orr, n.d.). Harmonization of regulatory environments reduces national control over environmental protection, supply regulation, and even labour standards, each of which can be considered barriers to trade. Additionally, investor state dispute resolution mechanisms, a prominent part of modern trade agreements, can also be seen as a loss of state decision making power. Under these mechanisms companies can now sue governments in private tribunals for decisions that damage future company profits (Ackerman et al., 2018). International and transnational corporations are the targeted beneficiaries of such legislation and agreements. As such they can be considered the primary citizens of the supra-regulatory environment created by international trade agreements and multi-lateral trade organizations.

Previously I have discussed how companies under neoliberalism are starting to take on colonial roles usually carried by national governments (Collard et al., 2016; Peck, 2001). This is an important change for Indigenous nations as they are now negotiating their sovereignty and access to their lands with multiple entities, no longer just a single Canadian authority (Cameron & Levitan, 2014). In many respects this is perceived as a move away from the paternalism of the state (Cameron & Levitan, 2014). However, corporate and national goals remain similar: to secure

access to the resources on Indigenous land. The international ownership of many of the active and proposed projects for Treaty 8 territory further complicates the picture. The mechanisms for accountability of international ownership are farther removed and are harder to regulate.

The concerns about neoliberal reregulation and international ownership apply not only to companies extracting fossil fuels but also to the range of other companies proposing major financial investments across Treaty 8 in BC, including renewable energy projects. Under current configurations there is significant ownership overlap between the fossil fuel companies and the major projects (See p.78 List of major owners). Additionally, many of the renewable energy projects are dependent on the electrification of fossil fuel extraction to create a market for expanded electricity production. Even if environmental impacts vary between industries, concerns about cumulative impacts on the territory, inadequate inclusion of First Nations in resource allocation decisions, and a lack of respect for traditional territories remain. As seen in the ownership maps (figures 3 and 4) both major projects and oil and gas are imbedded in global systems of capitalist accumulation. As long as accumulation is controlled by corporations we should expect all industries to show patterns of neoliberalization including the formation of corporate interest groups and corporate efforts to control extraction on Treaty 8 territory.

While companies in various sectors can play similar colonial roles we would expect national and international networks of companies to have slightly different interests (Carroll, 2010). While both groups are primarily focused on capital accumulation they may have different short and long-term outlooks in the region. Particularly, we would expect national capital to be more invested in regional relationships and possibly more interested in long term regional development. Of course, currently there are mechanisms such as transnational policy networks and interlocking directorates that lead to increased cohesion between national and transnational networks (Sapinski, 2015; Carroll & Sapinski, 2011; de Graaff, 2012). The increased cohesion tends to revolve around the norms of global capitalism, inherently favouring the interests of more transnational and integrated companies (Brownlee, 2005). Transnational interests are less responsive to local demands and less invested in local communities.

Do transnational interests in Treaty 8 projects also perpetuate concerns about colonization? The increasing role of corporations in the negotiation of access to Indigenous lands

in Canada certainly situates them as key players in controlling land and resources. Furthermore, transnational corporate networks are predominantly formed around the North Atlantic (Carroll, 2010). The ownership maps for both gas and major projects (Figures 3 and 4) both clearly show how prominent the global north is in these major capital-intensive industries. Though we may not recognize the names of companies as colonial, the distribution of ownership and the continued dependence on the North Atlantic area for capital investment leads to the effective continuation of capital flows and power asymmetry traditionally ascribed to colonialism.

The colonial power of ownership can be compounded by major owners. In the ownership network major owners are investors that have multiple ownership ties across Treaty 8 territory. The more ownership links exist the higher the exposure and stakes a company or investor has in the region. There are 34 companies that have multiple ownership stakes in both the core oil and gas companies and the major projects being proposed (listed below). Companies with multiple ownership links are likely to be much more interested in profits from Treaty 8 territory. Increased profit dependence also increases the likelihood that a company will be actively engaged in management in a region. The physical proximity of these overlapping ownership stakes incentivises owners to coordinate between their companies. Geographically overlapping ownership interests also increases the number of companies that will benefit from specific policy reforms, further aligning ownership positions (Scott, 1997). The companies listed below are organized by type of corporation, these will be used along with the different configurations of ownership identified by Scott (1997) to interrogate the implications of ownership.

List of Major Owners by Type of Corporation:

Below is a list of the 34 companies with interest in both major projects and oil and gas extraction. Five categories are used to differentiate between the different types of ownership interests. Colours are used to differentiate between Canadian and international ownership. Blue names are Canadian based Owners. Green names are US based owners. Purple names are based outside of the US and Canada.

Equity Management Firms

- BlackRock Inc.
- Charles Schwab Corporation
- Dimensional Fund Advisors
- FMR LLC
- Investco Ltd
- Legg Mason Inc
- Northern Trust Corporation
- Russell Investment Management LLC
- SEI Investments Co
- State Street Corporation
- Vanguard Group Inc.
- Wellington Management Group LLC
- AGF Management Ltd
- Capital Group
- CI Financial Corp.
- Connor, Clark & Lunn Financial Group
- Franklin Resources Inc.
- Lazard Limited

Holding Companies

- Power Corporation of Canada

Government Investment

- British Columbia Investment Management Corporation
- Province of Quebec
- Norway Sovereign Wealth Fund
- Regeringskansliet (Sweden)

Finance Companies (Banks, Insurance, etc)

- Bank of New York Mellon
- JP Morgan Chase & Co.
- Bank of Montreal
- Canadian Imperial Bank of Commerce (CIBC)
- Manulife Financial Corp
- Royal Bank of Canada
- Toronto Dominion Bank
- Axa SA
- Investec PLC
- UBS Group

Pension Funds

- TIAA Board of Overseers

Most ownership interests in the publicly traded companies operating on Treaty 8 territory are minority stakes. As previously discussed, a minority shareholder can still exert effective control over an organization (Brownlee, 2005). However often multiple minority ownership positions must be combined into a corporate interest cluster in order to have effective control. Corporate interest clusters influence company management through passive and active roles (Scott, 1997). These clusters tend to emerge among companies with similar structures and profit models, referred to above as types of ownership interest. The companies listed above have been grouped into types of ownership interest. The companies have been colour coded to reflect geographic cleavages that could also influence company interests. While Scott (1997) explores company clusters as a mechanism for exerting corporate control over other companies it is also important to recognize that these groups can form cohesive units for articulating the policy preferences of these coordinated ownership interests.

Ownership interests can control a company's actions, but ownership can also be an incentive for coordination between corporate actors. Scott's ownership configurations look at coordination as a mechanism for controlling corporations, but these same coordinated interests can also align to influence and control the conditions of extraction. Coordinated ownership interests are likely to be active at the provincial and national level and may have more specific policy preferences than those established through cohesion in networks of interlocking directorates.

Scott (1997) identifies different types of corporate organization associated with different types of ownership interest. Banks as owners are not just looking for profit, they are also looking for opportunities to finance company expansion. Groups of banks with shared ownership interests are likely to behave as a "corporate filiation": a cluster of banks with a shared interest in a company's success through mutual ownership. While the banks listed above may not have the same ownership overlaps, they certainly have strong shared regional ownership interests in extraction from Treaty 8 territory. It is possible that they would exhibit filial behaviour regarding the governance of extraction on Treaty 8.

The largest ownership group listed are the equity management firms. Equity management firms are one of the most important groups of institutional investors globally, and in 2008 were

responsible for about 30% of all US corporate ownership (Davis, 2008). Equity managers are passive owners and in order to maintain liquidity would rather exit a position than try to exercise managerial control (Davis, 2008; Scott, 1997). Multiple passive ownership interests can form "constellations of ownership" which control enough of any given company to affect its governance, even if no such coordinated actions are ever taken (Scott, 1997). The long list of equity management firms with overlapping interests in Treaty 8 territory suggests that constellations of ownership are an important factor in corporate decision making on Treaty 8. Many extraction companies looking to secure more investment from equity managers or aiming to protect their share price are likely to try and cater to the perceived expectations of the equity constellation of ownership. The equity management group is risk averse and will ordinarily only exercise power in order to protect their interests.

The passive approach to ownership of equity management firms is often shared by government investments and national endowment funds. However, as seen with the recent promise by the federal government of Canada to absorb financial losses in the Trans Mountain Pipeline expansion project, domestic government investments can also be used as a way to bolster an industry (Seskus, 2018). Government investments from foreign nations that do not lead to majority control should be primarily considered as passive investments. However, domestic government investments in resource extraction can be viewed as a tool to bolster government resource extraction policy.

The exercise of power in order to protect ownership interests takes on greater importance when investors interested in active management become involved. Though these represent a small portion of the overlapping ownership interests both private holding companies and pension funds are known to try and exert control over companies they acquire. The corporate clusters created around such active ownership interests are referred to as corporate webs (Scott, 1997). Corporate webs are characterized by central ownership interests with active and long-term control of the companies they own. Expect these companies to actively engage with challenges facing the companies they have ownership interests in. They are also likely to try and increase their control over companies through share buyouts, private financing of company

projects, and trying to secure support from other shareholders for specific management objectives or decisions.

Expect banks, pension funds, and holding companies to be fairly responsive to changes in the operating environment on Treaty 8. Equity management is more likely to be re-active, expect them to be risk averse, making changes based on perceived threats to profitability. Government investment is hard to influence, and in domestic situations should be considered a conflict of interest where the growth of government investment funds or pursuit of a political agenda is conflated with the long-term interests and wellbeing of the Canadian population (Alfred, 2009). Corporate power is expressed through a number of different ownership configurations. Though I have discussed this power primarily in the context of control over resources and protection of company profits it also has implications for the social influence of these companies. Simply put, companies with significant investments in the Treaty 8 region are more likely to insert themselves into the social, Indigenous, and regulatory dimensions of resource extraction on Treaty 8 territory.

Affiliations, Ownership, and Territorial Influence

There are many global trends and lessons about corporate power and ownership reflected in the corporate map of Treaty 8 territory. However, mapping companies operating on Treaty 8 territory also provides an important launch point to challenge corporate power. Throughout this paper I have used three conceptualizations of corporate power: allocative, strategic, and operational. These are not the only consequential manifestation of corporate will. Corporate influence exerted through reach and social cohesion is also important. In particular corporations can influence the political and social environments, including through the use of media, participation in public processes, and general "good will" public actions (Brisbois & Loë, 2017). The next section reflects on the articulation of corporate power and influence through the data collected for the Treaty 8 corporate map.

Allocative Power

Allocative power as exercised by corporations can be tracked through monetary flows. The ownership maps in figures 3 and 4 trace the flow of profits from Treaty 8 territory to the

global network of corporate owners. Following the flow of profits comes funding for future projects, expansion of operations, and sometimes structural and operational obligations for our core extractive companies. Of course, the environmental and social costs associated with any one project cannot be dislocated to follow the flows of capital. Because of this uneven distribution of costs and benefits frontline communities often seek tools for challenging and changing the allocative decisions of companies (Temper, 2018).

Major owners have ownership stakes that overlap both major projects and oil and gas companies operating on Treaty 8 territory (list p. 78). There are 7 companies with more than 5% ownership in companies belonging to both the major projects and oil and gas data sets (Table 10, Appendix A). The remaining investors with multiple ownership ties could achieve control of individual corporations through various corporate interest clusters. Some companies such as ARC Financial Corporation do not have cross sectoral ties but are actively looking to make direct equity investments in Canadian oil and gas extraction companies. In one example they helped finance Canbriam Energy, a company who now has 3 directors representing the company's private equity investors. Such major owners have allocative power over multiple extraction projects on Treaty 8 territory, making them key actors in the Treaty 8 extractive network.

Ownership ties between companies are not always directed by acquisitions, they can also be the result of asset sales. Companies such as ConocoPhillips have retained interest in holdings they have sold by accepting shares in the purchasing company as part of the payment. In May 2017 ConocoPhillips sold a significant portion of their western Canadian gas assets to Cenovus Energy. The deal netted 11 billion dollars in cash and 2 billion dollars in Cenovus Energy shares. The shares in Cenovus Energy represent a retained interest in the exploitation of western Canadian gas assets and a probable degree of control over Cenovus Energy's strategic direction.

Ownership and financial ties between companies are invariably conditional on binding legal terms. The financial obligations tying extractive companies to their funding, funders, and owners are the root of corporate allocative power but can also be important leverage points for activist intervention. There are a number of important campaigns that have focused around interrupting capital flows between ownership interests and extractive companies. A common campaign structure is the corporate boycott, such as those that contributed to the collapse of

forestry giant MacMillan Bloedel (Berman & Leiren-Young, 2011). Boycotts focus on reducing the profitability of extractive activities. Alternatively, Indigenous leaders have tried to interrupt project financing. Indigenous leader Arthur Manuel even went to the credit rating agency Standard and Poor's to argue that Canada's credit rating should be downgraded based on its outstanding debt and liabilities owed to Indigenous people (Manuel & Derrickson, 2015). These approaches could be adapted to target companies highlighted in this study as dependent on owners and creditors either for growth or to avoid financial woes.

The debt/equity (D/E) ratios on table 4 are an entry point into examining the relationship between extractive companies and their financiers or owners. The higher the D/E ratio of a company the more financially vulnerable they are to bankruptcy, giving creditors more influence on the exercise of allocative power. Pengrowth Energy has one of the highest D/E ratios (1.61) of the core companies listed. In 2017 financial reports it was revealed that they were in the process of selling 827 million dollars in assets in order to reduce their debt load by 66%. As a company with significant interests in the Groundbirch play of the Montney shale such a sizeable re-structuring of company debt is important to note. Reducing their debt load indicates the company was not generating enough revenue to sustain their debt. Reducing their debt load may indicate they are trying to return to a financially sustainable level of operations. Most likely once the company has reduced its debt load to a satisfactory level they will probably look to expand their more profitable operations. Areas such as the Groundbirch are liquids rich and have remained profitable over the last couple years of deflated natural gas prices. If Pengrowth successfully reduces their debt and holds onto their Groundbirch assets, then expect them to try and expand those operations.

Some companies such as Kelt Exploration have been financing growth through debt. In the third quarter of 2017 they made 52 million dollars in investments, which consumed their 24-million-dollar cash surplus and required 28 million in new debt. Their D/E ratio remains well below the industry average, so they will continue to be able to attract funding to expand their operations.

Companies such as Painted Pony have used senior notes to increase cash flow from operations. In Q3 of 2017 they repaid 141 million dollars in bank debts through the issuance of

senior notes. Senior notes tend to have a lower interest rate than other non-bank forms of financing such as Junior notes (Investopedia - 2018). Keeping an eye on the current ratio[13] can be an indicator of when companies may be trying to re-finance or re-structure their debt obligations. Companies trying to re-finance through any market mechanism are likely to be more vulnerable to public pressure.

Lastly, most companies try to re-invest profits from operations into expanding extraction. As previously mentioned some companies have combined cash surpluses with debt to expand operations. Others, such as Chinook energy, claim to have no debt (Chinook Energy, 2017). While debt is an important tool for economic growth some companies will try to avoid it. Companies that avoid debt through self-financing or reliance on equity financing from shareholders become very dependent on operating cash flow. Small companies dependent on their cash flow will be very responsive to changes or threats to their supply chain.

Allocative power follows cash flows. Cash flows are often embedded in ownership relationships. Ownership ties can help us identify key enabling actors in extraction on Treaty 8, such as ARC Financial, Connor Clark & Lunn Financial Group Ltd, and RBC (Table 10, Appendix A). These major owners can affect multiple oil and gas companies and major project proposals through their allocative power. Cash, in addition tracing ownership ties, lubricates extraction and expansion. There are many paths for financing extractive activities, and financing choices and company behaviour around debt can be used as entry points for challenging individual corporate actors.

Strategic Power

Strategic power belongs to the directors and managers of an organization (Carroll, 2004). It is established through a company's governance. Strategic power includes the ability to set a company's direction, to sign off on new acquisitions, to negotiate agreements with other stakeholders, and generally set a company's goals and objectives. As previously mentioned, the exercise of strategic power can be controlled or influenced by company owners through the active or perceived use of allocative controls. The exercise of strategic power can also be

[13] The current ratio measures current assets to liabilities that are due within the next fiscal year. A low current ratio is indicative of a company whose liquid assets and cash flow are insufficient to pay off near term debts.

influenced through the social networks of directors and managers. Thus, interlocking directorates can lead to shared identity and objectives across multiple companies (Brownlee, 2005).

Interlocking directorates increase social cohesion, leading to network-wide perspectives and shared outlook between managers of ostensibly competing companies (Carroll & Sapinski 2011; Brownlee, 2005). Network wide perspectives can influence the adoption of certain corporate practices such as Impact Benefit Agreements (Cameron & Levitan 2014). Adoption of corporate practices, establishment of social norms, and homogenization of a class based perspective are all possible outcomes of social cohesion (Brownlee, 2005). Social cohesion within interlocking directorates shapes the perspective of company directors and can inform the approach taken by corporate Canada towards Indigenous actors. Interlocking directorates can also lead to more immediate cooperation between neighbours in a network (Carroll & Sapinski, 2011; Brownlee, 2005). Interlocks between specific companies can have additional strategic implications for understanding the corporate landscape over Treaty 8 territory.

The Girvan-Newman communities presented earlier (Figure 2) as well as the beta-centrality scores are both useful tools for situating natural gas extractors in the Canadian corporate landscape. The network of core oil and gas companies has 6 robust corporate communities. Some of those groups, such as the peripheral extractors community, are at the edge of both the core network and the Canadian extractive network. Peripheral groups are unlikely to be exposed to the same diffusion of information across the corporate network as more well-connected companies. We would expect them to have the most distinct perspectives within the industry and to behave in a more competitive, less collaborative way with their neighbours.

The Canadian juniors community is very close knit as a number of actors are tied by multiple directors. Chinook and Storm resources both emerged from the sale of Storm Ventures to ARC Resources and should really be considered sister companies. The close ties between many of these actors suggests that they will pursue similar business strategies. The core companies in the Canadian juniors are primarily focused on exploration and drilling. They are dependent on other companies for transportation and refining. For these companies securing market access is a major concern. Painted Pony Ltd has entered into a strategic alliance with AltaGas Ltd to secure pipeline capacity and market access (Painted Pony, 2017). The strategic alliance is mirrored by a

direct interlock between the two companies. Another member of this community with stated market access issues is Chinook energy. In 2017 they had 13 operational wells, 2 of which were on standby because the company's compression station did not have the capacity to process the output of all their wells. The Canadian juniors community is dominated by extractive oil and gas juniors and to the extent that they form a network are likely to respond to concerns over market access, including new pipeline construction and industry demand for their product.

The remaining clusters are either significantly integrated into the national fossil fuel network or dominated by foreign interests and neighbours. The linking community is diverse and has several actors with high centrality in the Canadian corporate network. They are likely to conform to broad capitalist interests. The core extractors in this group are well established and probably less vulnerable to market action, though they may be more responsive to norm changes in the broader Canadian industry. The remaining clusters are dominated by international companies, some of which have been successfully dissuaded from extraction in Canada before[14]. One advantage of targeting large international companies is that Canadian projects represent a small portion of their interests. Protests and financial woes can convince these companies that some projects are more effort than they are worth.

Lastly, the exercise of strategic power is influenced by the legislative environment. In particular legislation can shape how and where companies choose to operate. BC has created reduced royalty areas to encourage drilling in specific areas of the Montney shale play (Painted Pony 2018). These reduced royalty areas in turn attract investment and construction, becoming marketing points for companies that have secured tenure there. Natural Gas Benefit Agreements are another regulatory mechanism shaping the legislative environment for these companies (Ministry of Aboriginal Relations and Reconciliation, BC, 2018). The legislative environment can be tailored to promote extraction by cutting operating costs and by providing investor certainty. The ability of Treaty 8 nations to in turn shape these legislative instruments through negotiation, developing parallel legislation, or even challenging existing legislation through the courts are powerful tools in shaping and constraining resource extraction.

[14] In 2012 Shell Canada caved to pressure and stopped plans for hydraulic fracturing in the "sacred headwaters" in norther British Columbia (Hoek, 2012). The campaign required both local resistance and international solidarity actions.

Strategic power over an organization belongs to directors and managers. Directors and managers are influenced by the legislative environment, their education, and their peer groups but motivated by the financial imperatives built into corporate governance. The communities identified earlier (Figure 3, Table 4) highlight the peer groups for the core companies being studied. Understanding the characteristics of these peer groups and their relationship to the national network of fossil fuel extractors can inform effective strategies for influencing or challenging extraction on Treaty 8 territory. It is also worth noting that a successful campaign over a more central actor is likely to receive greater attention and response from the broader corporate network.

Operational Power

Operational power is the direct control over day to day operations. Operational power belongs to managers and employees and controls labour in order to generate revenue. Less related to the networks a company is imbedded in, it is worth noting that strategic and allocative decisions shape and direct operational power. Some companies are vertically integrated and take care of extracting, shipping, processing, and even marketing their oil, while other companies are focused on specific elements of the extractive process. Structural relationships such as the one between Painted Pony and AltaGas have significant operational consequences because Painted Pony becomes dependent on AltaGas' operational power for the sale of its products. At other times, regulatory environments such as the reduced royalty areas direct where companies will set up shop. Allocative power can dictate operations, but also remains dependent on operations for continued cash flow and future growth.

Both Harvest Operations and Murphy Oil are interesting examples of the importance of regional operations for cash flow and future growth. Harvest Operations is a subsidiary of the Korean National Oil Company (KNOC). Harvest Operations explores, exploits, transports, and refines their own product. This vertically integrated subsidiary of KNOC is their largest subsidiary based on proven and probable reserves and their third largest subsidiary by volume of production. Based on production and reserve volume Harvest Operations is an important subsidiary for KNOC. KNOC will be very interested in protecting and profiting from Harvest Operations' assets.

Murphy Oil is another company very dependent on its regional oil and gas operations in Canada. In 2016 26% of their net production came from Canada. Their Montney assets form a significant part of their Canadian portfolio. Murphy Oil extraction operations are dependent on infrastructure belonging to other companies, including TransCanada's pipelines to sell their gas beyond Alberta's AECO gas sales hub and get the premium prices associated with other North-American and world markets (Murphy Oil, 2017). Murphy Oil is dependent on Treaty 8 operations for revenue but also dependent on other companies and infrastructure. These operational dependencies can create entry points to affect the company.

Operational power does not ultimately decide future projects, but strategic and allocative power are both dependent on the revenues generated from operations. Thus operational power is both exerted on the land, but can in turn be exerted back on management. The power of unions is derived from their ability to disrupt operational power (Pfeffer & Salancik, 2003). Understanding how companies are dependent on their northeast BC operations for revenue, as well as what structural limitations might exist to their operations (eg. market access, lack of compressors, lack of access to cheap energy) can inform on the ground campaign tactics against industry.

Changing the discourse

First Nations across Canada are seeking to assert their sovereignty. Part of Indigenous sovereignty is decision making power over natural resource access and use (Coburn & Atleo, 2016). As Indigenous groups seek to increase their power over natural resource use and access they should expect corporations to attempt to influence Indigenous governments and governance processes. It is common practice within western economies for corporations to seek to control their regulatory environment (Miller & Harkins, 2010). As First Nations become more important actors in regulating natural resources we should expect corporations to increase their efforts to influence Indigenous actors. The corporate map elaborated in this thesis helps to track some of the relationships linking resource extractive companies on Treaty 8 territory to each other and to global networks of capital accumulation. Other works have tracked the relationship between networks of capital accumulation in various sectors of the Canadian economy, including

the domination of the Canadian media environment by a few highly networked companies (Bronwlee, 2005). Currently the relationship between Canada's corporate network and First Nations is very opaque, so I cannot comment directly on how the corporate extractive network influences First Nations governance. However, Indigenous actors seeking to temper or control the influence of corporations on their territories should be conscious that corporations have many tools to extend their influence into a community (summary in table 7).

Table 7 - Sources of corporate power and influence in communities

Allocative Power	**Strategic Power**	**Operational Power**	**Influence via Reach**	**Influence via Cohesion**
Funding for community projects	Use of lawsuits to bully activists/ silence opposition	Employment	Direct links with government through staff or business relation	Multiple corporations sharing the same opinion
Guaranteed spending in the local community	Impact Benefit Agreements and other non-treaty agreements	Lock-outs and temporary closures	Access to media and other channels of public discourse	Support from business councils and industry groups
Capital flight	Decisions about where to site new facilities		Creation and provision of scientific data	Intellectuals promoting virtues of capitalism

Table 7 illustrates some tools corporations can use to influence a community. Some of the direct power tools such as employment come with benefits to the local community, while other measures such as capital flight from a community are more punitive. Reach and cohesion affect the conversation about, and perception of, corporations and extraction in a community. In all cases the tools increase community acceptance of a company or extractive project, leading to "governance with the consent of the masses" (Carroll 2004).

Structural, allocative, and operational power are all direct mechanisms of control that should be considered, especially when signing land over to companies for extraction or entering into joint business agreements. However, corporations also have influence through reach and social cohesion. Corporate influence relies on direct mechanisms of power such as employment and charitable funding to communities as well as indirect tools to control public discourse such as access to media, control over information environments, and access to decision makers.

Regional employment creates a strong tie between a company and a community. The tie leads to a perception of shared fates; what is good for the company is also good for the community. Companies can further emphasise the importance of the relationship between

extraction and community wellbeing by providing funding to community improvement projects such as regional sports centers or school buildings (McSheffrey et al., 2017).

The conversational control created by financial ties between extractive companies and the communities they operate in are complemented by corporate integration into public and government conversations (Sherval, 2015; McSheffrey et al., 2017). Corporations will seek to control public conversations by providing their own experts and information. Regardless of the sincerity of the experts or information provided the self-interest of a company must be considered when judging corporate engagement in public discourse. Companies have also been documented as having special access to decision makers in British Columbia (Daub & Yunker, 2018). Extractivism is maintained between corporations, decision makers, and communities who agree that their common interest lies in the extraction of natural resources. Where communities disagree but government and industry side, conflicts emerge.

Corporations will try to integrate themselves into the community fabric, try to control the information environment, and influence decision makers. All these are attempts to structure their operating environment. First Nations communities are no exception to these corporate tactics. Mechanisms for formal cooperation with corporations such as Impact Benefit Agreements should be considered in this context (Cameron & Levitan, 2014). Though I have not been able to assess the links between corporations and Treaty 8 nations I want to dedicate a few lines to discussing how the corporate map can be used to engage corporations.

A primary element of corporate relations strategy is controlling information and public conversation about a project or industry. As corporations seek to control the information environments it is imperative that First Nations begin to create their own information. The Fort Nelson First Nations has a strong lands management department that has produced impressive independent research (Garvie et al., 2014). To give one example, the information created by the lands department could be used to situate each company within the cumulative impacts of the industry. Placing companies in context of cumulative environmental impacts specifies the environmental debt of these companies to the region. Quantifying environmental debt can be the basis for reparations from corporations (Frumhoff et al., 2015). First Nations' capacity to

provide independent environmental assessments enables them to insert their own perspectives into the public discourse (Garvie & Shaw, 2016).

Relationships with local communities are a second element of corporate influence. Employment and investment in community infrastructure are important parts of just compensation and profit sharing that should accompany resource extraction. However, the flow of capital into a community also becomes a tool of control. Understanding the transnational flow of capital through ownership (Figures 3 and 4) can provide a powerful illustration of how money continues to follow colonial patterns of organization.

Lastly, social network analysis provides a perspective of corporate influence as emergent from a unified community of extractive interests. The links between companies create pathways of information exchange that create opportunities for cooperation, but also lead to a homogenization of opinions and a feeling of shared identity between corporate directors (Carroll & Sapinski, 2011; Brownlee, 2005; Sapinski, 2015). While a First Nation may be engaging with only one corporation the outcome of that negotiation could have lasting impacts in the extractive network. From the unified nature of the corporate extractive community we can expect that corporations will seek to reduce the scope of negotiations, so concessions to First Nations only affect one project, but we can also expect them to try and secure generally favourable conditions of extraction. Favourable conditions of extraction can include increasing profits through low royalty rates. Community dependence on profits from extraction also favours extraction by reducing community bargaining power vis-à-vis the expansion of extraction. Case by case regulation favours extraction because it allows companies to negotiate permissions for specific environmental impacts, including converting lakes into tailings ponds, such as the plans to turn a nearby lake into a tailings holding pond at the Brucejack gold mine (Environment and Climate Change BC, 2015).

Perceiving corporations as part of a unified extractive network should help frame the context of negotiations between Indigenous actors and corporations. Understanding that certain interests are likely to be shared by most corporate actors should prompt nations to consider the business environment that ensues. Additionally, understanding extractive companies as part of

a community of extractors should help First Nations look for ways to control the power relations between extractive companies and rural and remote communities.

5. Conclusion

"There are flames burning on the side of the Alaska highway that have been there my entire life"
– Caleb Behn, Fractured Land 2016

Extractivism. Source of wealth and source of conflict. Treaty 8 territory in northeastern BC has become a hotbed of natural resource extraction. Forests are cleared for timber. The earth is moved for coal. Wells are drilled for oil and gas. Rivers are dammed, valleys flooded, and ridges covered in wind turbines to produce electricity. The traditional lands of the Fort Nelson, Saulteau, West Moberly, Halfway River, Doig River, and Prophet River First Nations have and continue to export tremendous wealth.

The decisions to extract resources from Treaty 8 lands are increasingly being made by corporations. This research has focused on the companies driving natural gas and oil extraction, as well as the companies ready to develop multi-million-dollar projects. The oil and gas companies are part of a national network of extractors, refiners, and transporters profiting from the exploitation of fossil fuels. The major project proponents are seeking long term investment opportunities before making multi-million-dollar commitments. Profits for both groups are dependent on the exploitation of Treaty 8 resources. Through their role in the regional economy and their allocative and operational power over extraction activities corporations become central actors in resource management. Indeed, the neoliberal trend in resource extraction sees companies playing a greater role not just as extractors, but in setting regulation and mitigation measures. As governments offload environmental management onto companies through policies such as professional reliance, the companies with land and projects on Treaty 8 territory gain more control over the resource extraction process.

Treaty 8 nations, civil society groups such as Keepers of the Water, and individuals like Caleb Behn also have a stake in land and resource management in the region. First Nations have a sovereign claim to their traditional territory. As seen in earlier examples on LNG regulation and opposition to the Site C dam, the long-term management goals of Treaty 8 nations regularly clash with the goals expressed by the colonial governments of BC and Canada, as well as those

expressed by companies. It is unsurprising that First Nation land use plans conflict at times with colonial and corporate land use plans. First Nations have a much longer-term interest in the management of their territories and must live with the environmental consequences of rampant extractivism. Part of the conflict between Indigenous actors and extractive projects also stems from Indigenous Knowledge. Indigenous actors are able to express radically different objectives for their communities and their environment than the visions acted on through the western economic system (Atleo, 2011; McGregor, 2005). First Nations land management objectives are worth empowering for their role in the resurgence of Indigenous identities, respecting Indigenous sovereignty, and for their potential to fundamentally improve the earth-human relationship.

This research was shaped by the goal of supporting groups trying to assert Indigenous visions for Treaty 8 territory. Understanding the network of corporations in the management and extraction of natural resources helps establish a clear picture of corporate extractivism with which Indigenous land use can be contrasted. The network of extractive companies operating on Treaty 8 territory has significant implications for resource management and assertions of Indigenous sovereignty. Corporate networks tend to become cohesive, sharing common objectives and policy preferences. The network of oil and gas companies share a common revenue source and will cooperate to secure its easy access. The cohesiveness of Canadian oil and gas extractors can only be bolstered by the fact that almost all the companies studied have Canadian headquarters in Calgary. The major projects represent a less cohesive group but their respective ties to pre-existing industries in the region are probable pathways for influence. Many of the projects proposed connect to other industrial or extractive projects in the region, creating a corporate network that is co-dependent for growth. Cohesiveness of extractive actors and rising corporate influence increases corporate control over resource extraction.

The ownership of the companies in this study is globally distributed. Corporations from over 20 countries are set to benefit from the major projects alone. Company shareholders are the ultimate beneficiaries of extraction, but also frequently have allocative power over company decisions. As companies become more central in decision making over resource extraction, the interests of corporate ownership gain overarching influence in natural resource management.

The corporate network profiting from and driving resource extraction is explored in this paper, and some avenues of challenging the different dimensions of corporate power are suggested. Nevertheless, there remain many important unanswered questions and powerful research directions that can increase the ability of regional groups to understand and challenge corporate power. Thought inspired by Indigenous actors this research did not have time to explore the relationship between First Nations and the extractive companies on Treaty 8 territory. Future research could look at ways of quantifying the contribution of extraction to Indigenous objectives such as asserting Indigenous sovereignty and obtaining a fair share of benefits from extraction (BC First Nations Energy & Mining Council, 2010). Another important dimension of corporate power briefly discussed but hardly explored is the rate of local employment. Employment is one of the most direct benefits of resource extraction but also an important means of social control. Research into employment rates, distribution of employment, and the use of employment guarantees would add considerable analytical value to the local application of a corporate map. Lastly, there is room for this type of research to work more directly with First Nations. Power mapping can be enhanced with a deliberative exchange between community groups, helping to rank corporate actors in terms of influence, priority for action, and even differentiating between good and bad actors (Noy, 2008; Schiffer, 2007). The tools of corporate and power mapping have tremendous potential to inform political discourse.

The data collected and presented in this research can significantly contribute to organizations' and nations' strategic planning efforts. Significant results and key elements of corporate power have been assembled into a community report presented to Caleb Behn and Keepers of the Water (Appendix C). There has been some discussion of how this research can be expanded to benefit all Treaty 8 nations in Canada. Next I briefly touch on how this data and power map can be used by community groups and First Nations in their strategic planning efforts for policy, negotiation, and activism.

Information on interlocking directorates, foreign ownership, and qualitative details of individual companies can provide substantial information for commonly used strategic planning tools such as: Strength, Weakness, Opportunities, and Threats analysis as well as environmental scans. Organizational goals cannot be dictated by outside researchers, but information such as

which watersheds are most impacted by fossil fuel extraction (Table 8 Appendix A) can help inform restoration and conservation goals. Knowledge about strategic power can help set realistic objectives[15] for influencing the development of new extraction projects (see p. 87 on strategic implication of royalties). Strategies to achieve organizational goals can benefit substantially from information on corporate ownership, including previously unidentified companies with significant regional interests (see Table 10 on major owners Appendix A). Organizational tactics, specific actions to obtain objectives, are always informed by an organizations' mandate and ideology, but can be further informed by information gathered on corporate communities (see pg 56 on Girvan-Newman communities), company financial data (see Debt/Equity ratio on Table 4), knowledge of instrumental linkages (see pg. 49 and 86), and qualitative observations.

This research can even help challenge corporate power directly. Luke's conception of power argues it is most effective when it is unobserved (Piper 2005). Strategic information can help identify previously unidentified power players in the region and suggest avenues along which their power is being exercised. This information can be combined with community knowledge and power theory (see pg 82 and table 7) to develop responses to excesses of corporate power. Lastly, some of the information in the study can be used as a direct communication tool with the public, maps such as the industrial impacts map in figure 1 help convey the scale of industrial activity while the corporate ownership maps in figures 3 and 4 demonstrate the colonial distribution of profits.

Corporations drive resource extraction. Resource extraction can have many cumulative social and ecological impacts that are experienced first and most extremely by Indigenous people. Corporate mapping and power mapping reveal the extractive network driving the resource rush on Treaty 8 territory. Companies within the extractive network can be cohesive or respond to industry specific interests to protect the conditions of accumulation. The colonial organization and defence of capital accumulation prioritizes colonial-capitalist relationships between people and land (Coburn & Atleo, 2016). Revealing the extractive network can help Indigenous actors identify and challenge specific instances of colonial-capitalist relations.

[15] Objectives can be though of as the milestones along the way to achieving a goal.

Ultimately, the framework laid out in this paper can serve as a basis for further analysis of extractive networks in Canada. The tools of corporate power mapping can support Indigenous lead actions at the scale needed to resist assimilation to industry objectives and empower Indigenous alternatives.

References:

Ackerman, F., Alvarez Bejar, A., Laxer, B., & Beachy, B. (2018). NAFTA 2.0: For People or Polluters? *Sierra Club USA, Council of Canadians, Greenpeace Mexico*, 48.

Acosta, A. (2013). Extractivism and neoextractivism: two sides of the same curse. M. Lang and D. Mokrani (Ed.), In *Beyond Development* (Vols. 1–61, pp. 61–86). Transnational Institute

Adkin, L. E., & Miller, B. (2016). Alberta, Fossil Capitalism, and the Political Ecology of Change. L. E. Adkin (Ed.), In *First World Petro-Politics: The Political Ecology and Governance of Alberta* (p. ch. 16). Toronto: University of Toronto Press.

Alcantara, C. (2008). To Treaty or Not to Treaty? Aboriginal Peoples and Comprehensive Land Claims Negotiations in Canada. *Publius: The Journal of Federalism*, *38*(2), 343–369. https://doi.org/10.1093/publius/pjm036

Alfred, G. T. (2009). Colonialism and State Dependency. *Journal of Aboriginal Health; Victoria*, *5*(2), 42–60.

Antunes, P., Santos, R., & Videira, N. (2006). Participatory decision making for sustainable development—the use of mediated modelling techniques. *Land Use Policy*, *23*(1), 44–52. https://doi.org/10.1016/j.landusepol.2004.08.014

Aragón, F. M. (2015). Do better property rights improve local income?: Evidence from First Nations' treaties. *Journal of Development Economics*, *116*, 43–56. https://doi.org/10.1016/j.jdeveco.2015.03.004

Arthur Manuel, & Derrickson, R. M. (2015). *Unsettling Canada: A National Wake-Up Call*. Toronto: Between the Lines.

Atherton, E., Risk, D., Fougère, C., Lavoie, M., Marshall, A., Werring, J., … Minions, C. (2017). Mobile measurement of methane emissions from natural gas developments in northeastern British Columbia, Canada. *Atmospheric Chemistry and Physics; Katlenburg-Lindau*, *17*(20), 12405–12420. http://dx.doi.org/10.5194/acp-17-12405-2017

Atleo, C., Jr. (2009). *From Indigenous Nationhood to Neoliberal Aboriginal Economic Development : Charting the Evolution of Indigenous-Settler Relations in Canada*. Victoria, CA: Canadian Social Economy Hub. Retrieved from http://site.ebrary.com/lib/alltitles/docDetail.action?docID=10360304

Atleo, E. R. (2011). *Principles of tsawalk: an Indigenous approach to global crisis*. Vancouver: UBC Press.

Bardi, U. (2009). Peak oil: The four stages of a new idea. *Energy*, *34*(3), 323–326. https://doi.org/10.1016/j.energy.2008.08.015

BC Environmental Assessment Act: Reviewable Projects Regulation. (2016, February 29). Retrieved July 19, 2018, from http://www.bclaws.ca/Recon/document/ID/freeside/13_370_2002#section3

BC First Nations Energy & Mining Council. (2010). *Sharing the Wealth: First Nations Resource Participation Models*.

BC Hydro. (2013). November 2013 Integrated Resource Plan. Retrieved May 25, 2018, from https://www.bchydro.com/about/planning-for-our-future/irp/current-plan/document-centre/reports/november-2013-irp.html

BC Oil and Gas Commission. (2018, January). Provincial Oil and Gas Tenure Registry Extract (non-confidential records) - ips_extract - Data Catalogue. Retrieved December 8, 2017,

from https://catalogue.data.gov.bc.ca/dataset/provincial-oil-and-gas-tenure-registry-extract-non-confidential-records-/resource/4bc42b04-f126-4f91-90de-804b27cd51f2?inner_span=True

Berman, T., & Leiren-Young, M. (2011). *This crazy time: living our environmental challenge*. Toronto: Alfred A. Knopf Canada.

Bonacich, P. (1987). Power and Centrality: A Family of Measures. *American Journal of Sociology*, *92*(5), 1170–1182. https://doi.org/10.1086/228631

Boralex. (n.d.). Trousse de l'investisseur - Investisseurs | Boralex. Retrieved October 12, 2017, from https://www.boralex.com/investisseurs/trousse-de-l-investisseur

Borgatti, S. P., Everett, M. G., & Freeman, L. C. (2002). Ucinet 6 for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.

Brisbois, M. C., & Loë, R. C. de. (2017). Natural resource industry involvement in collaboration for water governance: influence on processes and outcomes in Canada. *Journal of Environmental Planning and Management*, *60*(5), 883–900. https://doi.org/10.1080/09640568.2016.1182899

Brown, G. S., Rettie, W. J., Brooks, R. J., & Mallory, F. F. (2007). Predicting the impacts of forest management on woodland caribou habitat suitability in black spruce boreal forest. *Forest Ecology and Management*, *245*(1), 137–147. https://doi.org/10.1016/j.foreco.2007.04.016

Brown, P., & Garver, G. (2009). *Right Relationship: Building a Whole Earth Economy*. Berrett-Koehler Publishers.

Brownlee, J. (2005). *Ruling Canada: Corporate Cohesion and Democracy*. Halifax: Fernwood Publishing.

Cameron, E. (2015). *Far Off Metal River: Inuit Lands, Settler Stories, and the Making of the Contemporary Arctic*. UBC Press.

Cameron, E., & Levitan, T. (2014). Impact and Benefit Agreements and the Neoliberalization of Resource Governance and Indigenous-State Relations in Northern Canada. *Studies in Political Economy*, *93*(Spring), 25–52.

Canning, P. (2018). I could turn you to stone: Indigenous blockades in an age of climate change. *International Journal of Indigenous Law*.

Carroll, W. (2004). Corporate Power in a Globalizing World: A Study in Elite Social Organization. In *Corporate Power in a Globalizing World: A Study in Elite Social Organization.* (pp. 1–13). Don Mills (Ontario): Oxford University Press.

Carroll, W. K. (2010). *The Making of a Transnational Capitalist Class: Corporate Power in the 21st Century*. New York, NY, USA: Zed Books.

Carroll, W. K. (2017). Canada's Carbon-Capital Elite: A Tangled Web of Corporate Power. *Canadian Journal of Sociology,* 42(3) 225-260

Carroll, W. K., & Sapinski, J. P. (2011). Corporate Elites and Intercorporate Networks. In *The SAGE Handbook of Social Network Analysis* (pp. 180–195). London: SAGE Publications https://doi.org/10.4135/9781446294413

Carroll, W., & Sapinski, J. P. (2013). Embedding Post-Capitalist Alternatives: The Global Network of Alternative Knowledge Production. *Journal of World-Systems Research*, *19*, 211–240. https://doi.org/10.5195/jwsr.2013.508

Carter, A. V., & Zalik, A. (2016). Fossil Capitalism and the Rentier State: Towards a Political Ecology of Alberta's Oil Economy. L.E. Adkin (Ed.), In *First World Petro-Politics: The Political Ecology and Governance of Alberta* (p. ch. 2). Toronto: University of Toronto Press.

Chinook Energy Inc. (n.d.) Reports and Filings - Chinook Energy Inc. Retrieved September 20, 2017, from http://www.chinookenergyinc.com/your-investment/reports-and-filings/

CNRL. (n.d.). Canadian Natural Resources Investor Documents. Retrieved September 24, 2017, from https://www.cnrl.com/disclaimer.html?redirect=https://www.cnrl.com/investor-information/

Coburn, E., & Atleo, C. (Kam'ayaam/Chachim'multhnii). (2016). Not Just Another Social Movement: Indigenous Resistance and Resurgence. In *A World To Win: Contemporary Social Movements and Counter Hegemony*. ARP Books.

Collard, R.-C., Dempsey, J., & Rowe, J. (2016). *Re-regulating Socioecologies Under Neoliberalism*. Retrieved from https://escholarship.org/uc/item/6dr7b3s9

Coulthard, G. S. (2014). *Red Skin, White Masks*. University of Minnesota Press. Retrieved from https://muse.jhu.edu/book/35470

Cox, B. A., & Rogerson, C. M. (1985). The corporate power elite in South Africa: Interlocking directorships among large enterprises. *Political Geography Quarterly*, *4*(3), 219–234.

Daly, H. (1982). Introduction to the Steady State Economy. In *Economics, Ecology, Ethics. Essays towards a steady state.* (pp. 1–17). Retrieved from https://www.dropbox.com/home

Daly, H. (1992). Allocation, Distribution, and Scale: towards and economics that is efficient, just and sustainable. Retrieved January 27, 2016, from https://www.dropbox.com/home/EE%20seminar?show_banner=1

Daub, S., & Yunker, Z. (2018). Fossil fuel industry accustomed to guarding the hen house, documents reveal. *BC Solutions: News and Commentary from the Canadian Centre for Policy Alternatives' BC Office*, 1–2.

David Harvey. (2003). *The New Imperialism*. Oxford University Press.

Davis, G. F. (2008). A new finance capitalism? Mutual funds and ownership re-concentration in the United States. *European Management Review*, *5*(1), 11–21. https://doi.org/10.1057/emr.2008.4

Demaria, F. (2010). Shipbreaking at Alang–Sosiya (India): An ecological distribution conflict. *Ecological Economics*, *70*(2), 250–260. https://doi.org/10.1016/j.ecolecon.2010.09.006

Encana. (n.d.). Shareholder information | Encana Corporation. Retrieved September 24, 2017, from https://www.encana.com/investors/shareholder/

Environment and Climate Change BC. (2015, March 26). Brucejack Gold Mine granted environmental assessment approval. Retrieved July 20, 2018, from https://news.gov.bc.ca/stories/brucejack-gold-mine-granted-environmental-assessment-approval

Escobar, A. (2007). Worlds and Knowledges Otherwise. *Cultural Studies*, *21*(2–3), 179–210. https://doi.org/10.1080/09502380601162506

Farnsworth, K., & Holden, C. (2006, July). The Business-Social Policy Nexus: Corporate Power and Corporate Inputs into Social Policy. Retrieved March 10, 2017, from

/core/journals/journal-of-social-policy/article/div-classtitlethe-business-social-policy-nexus-corporate-power-and-corporate-inputs-into-social-policydiv/49CFDC1A04B97E06759BEAD89BFAC807

Flanagan, T., Alcantara, C., & Dressay, A. L. (2010). *Beyond the Indian Act: Restoring Aboriginal Property Rights*. McGill-Queen's Press - MQUP.

Fractured Land (2016). Documentary film by F. Rayher and D. Gillis.

Frumhoff, P. C., Heede, R., & Oreskes, N. (2015). The climate responsibilities of industrial carbon producers. *Climatic Change*, *132*(2), 157–171. https://doi.org/10.1007/s10584-015-1472-5

Garvie, K. H., Lowe, L., & Shaw, K. (2014). Shale Gas Development in Fort Nelson First Nation Territory: Potential Regional Impacts of the LNG Boom. *BC Studies: The British Columbian Quarterly*, *0*(184), 45–72.

Garvie, K. H., & Shaw, K. (2015). OIL AND GAS CONSULTATION AND SHALE GAS DEVELOPMENT IN BRITISH COLUMBIA - ProQuest. Retrieved June 5, 2017, from http://search.proquest.com/openview/1924f2f2337b7e3a10fd9656d5a0786f/1?pq-origsite=gscholar&cbl=35731

Garvie, K. H., & Shaw, K. (2016). Shale gas development and community response: perspectives from Treaty 8 territory, British Columbia. *Local Environment*, *21*(8), 1009–1028. https://doi.org/10.1080/13549839.2015.1063043

Girvan, M., & Newman, M. E. J. (2002). Community structure in social and biological networks. *Proceedings of the National Academy of Sciences*, *99*(12), 7821–7826. https://doi.org/10.1073/pnas.122653799

Government of Canada; Indigenous and Northern Affairs Canada, C. B. (2009). *Treaty Research Report - Treaty Eight (1899)* (report). Retrieved from https://www.aadnc-aandc.gc.ca/eng/1100100028809/1100100028811

Graaff, N. de. (2011). A global energy network? The expansion and integration of non-triad national oil companies. *Global Networks*, *11*(2), 262–283. https://doi.org/10.1111/j.1471-0374.2011.00320.x.

Graham, N., Daub, S., & Carroll, B. (2017, March 8). Mapping Political Influence: Political donations and lobbying by... Retrieved March 8, 2017, from http://www.corporatemapping.ca/bc-influence/

Haeussler, S., Bedford, L., Leduc, A., Bergeron, Y., & Kranabetter, J. (2002). Silvicultural disturbance severity and plant communities of the southern Canadian boreal forest. *Silva Fennica*, *36*(1). https://doi.org/10.14214/sf.565

Hali Healy, Joan Martinez-Alier, Leah Temper, Mariana Walter, & Julien-Francois Gerber. (2013). *Ecological Economics from the Ground Up (Paperback) - Routledge*. Routledge. Retrieved from https://www.routledge.com/products/9781849713993

Harris, C. (2004). How Did Colonialism Dispossess? Comments from an Edge of Empire. *Annals of the Association of American Geographers*, *94*(1), 165–182. https://doi.org/10.1111/j.1467-8306.2004.09401009.x

Hartsock, N. (2006). Globalization and Primitive Accumulation. In *David Harvey: A Critical Reader. Editors: Noel Castree and Derek Gregory* (pp. 167–190). Blackwell Publishing Ltd.

Hoek, J. (2012). B.C.'s Sacred Headwaters to remain protected from drilling. Retrieved from https://www.theglobeandmail.com/news/british-columbia/bcs-sacred-headwaters-to-remain-protected-from-drilling/article6504385/

Huffington Post. (2014). Canada largest contributor to deforestation: study. Retrieved from http://www.huffingtonpost.ca/2014/09/05/canada-deforestation-worst-in-world_n_5773142.html

Investopedia, LLC. (2018). Investopedia - Sharper Insight. Smarter Investing. Retrieved May 26, 2018, from https://www.investopedia.com/

IUCN. (2016, June). Oslo Manifesto for Ecological Law and Governance.

Kulchyski, P. (2013). *Aboriginal Rights Are Not Human Rights*. Winnipeg: ARP Books.

Kulchyski, P., & Bernauer, W. (2014). Modern Treaties, Extraction, and Imperialism in Canada's Indigenous North: Two Case Studies. *Studies in Political Economy*, *93*(1), 3–24. https://doi.org/10.1080/19187033.2014.11674962

Linnitt, C. (2018). Words from the 'Sacrifice Zone': Caleb Behn on How B.C. is Failing First Nations on Fracking. Retrieved May 25, 2018, from https://thenarwhal.ca/words-sacrifice-zone-caleb-behn-how-b-c-failing-first-nations-fracking/

Mansfield, B. (2007). Privatization: Property and the Remaking of Nature–Society Relations Introduction to the Special Issue. *Antipode*, *39*(3), 393–405. https://doi.org/10.1111/j.1467-8330.2007.00532.x

Markey, S. (2014). *Second Growth: Community Economic Development in Rural British Columbia.* Vancouver: UBC Press.

Martínez-Alier, J. (2012). Environmental Justice and Economic Degrowth: An Alliance between Two Movements. *Capitalism Nature Socialism*, *23*(1), 51–73. https://doi.org/10.1080/10455752.2011.648839

Massimo De Angelis. (2001). Marx and primitive accumulation: the continuous character of capital's enclosures. *The Commoner*, (2.01), 1–22.

Maxwell, J. A., & Randall, A. (1989). Ecological economic modeling in a pluralistic, participatory society. *Ecological Economics*, *1*(3), 233–249. https://doi.org/10.1016/0921-8009(89)90007-4

McCarthy, J. (2004). Privatizing conditions of production: trade agreements as neoliberal environmental governance. *Geoforum*, *35*(3), 327–341. https://doi.org/10.1016/j.geoforum.2003.07.002

McGarth, M. (2016). Five hottest years on record have occurred since 2011. *BBC*. Retrieved from http://www.bbc.com/news/science-environment-37900400

McGregor, D. (2005). Coming Full Circle: Indigenous Knowledge, Environment, and Our Future. *The American Indian Quarterly*, *28*(3), 385–410. https://doi.org/10.1353/aiq.2004.0101

McSheffrey, E., Souza, M. D., Cribb, R., Sonntag, P., News, P. W. E. in, Energy, (2017, October 1). Fear and money breed silence in Saskatchewan. Retrieved May 25, 2018, from https://www.nationalobserver.com/2017/10/01/news/fear-and-money-breeds-silence-saskatchewan

Meadows, D. H., Meadows, D. L., Randers, J., & Behrens, W. W. (1972). The limits to growth. A report for the Club of Rome's project on the predicament of mankind. *The Limits to*

Growth. A Report for the Club of Rome's Project on the Predicament of Mankind. Retrieved from https://www.cabdirect.org/cabdirect/abstract/19721802567

Menzies, C. R. (2001). Reflections on research with, for, and among Indigenous peoples. *Canadian Journal of Native Education*, *25*(1), 19–36.

Merchant, C. (2013). *Reinventing Eden: The Fate of Nature in Western Culture*. Routledge.

Mignolo, W. D. (2007). Delinking. *Cultural Studies*, *21*(2–3), 449–514. https://doi.org/10.1080/09502380601162647

Miller, D., & Harkins, C. (2010). Corporate strategy, corporate capture: Food and alcohol industry lobbying and public health. *Critical Social Policy*, *30*(4), 564–589. https://doi.org/10.1177/0261018310376805

Ministry of Aboriginal Relations and Reconciliation. (2018). Natural Gas Benefits Agreements - Province of British Columbia. Retrieved May 26, 2018, from https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/consulting-with-first-nations/first-nations-negotiations/natural-gas-pipeline-benefits-agreements

Mulrennan, M. E., Rodney, M., & Scott, C. H. (2012). Revamping community-based conservation through participatory research. *The Canadian Geographer, 56(2),*243-259. DOI: 10.1111/j.1541-0064.2012.00415.x

Murphy Oil Corporation. (n.d.) Investors - Investor Overview. Retrieved from: http://ir.murphyoilcorp.com/phoenix.zhtml?c=61237&p=irol-irhome Accessed on: 2017-09-21

Noy, D. (2008). Power Mapping: Enhancing Sociological Knowledge by Developing Generalizable Analytical Public Tools. *The American Sociologist*, *39*(1), 3–18. https://doi.org/10.1007/s12108-008-9030-5

O'Brien, D., Manseau, M., Fall, A., & Fortin, M.-J. (2006). Testing the importance of spatial configuration of winter habitat for woodland caribou: An application of graph theory. *Biological Conservation*, *130*(1), 70–83. https://doi.org/10.1016/j.biocon.2005.12.014

Orr, C. J. (n.d.). A dead end in history: Global environmental governance and the hegemony of the neoliberal belief system. Unpublished manuscript.

Ostrom, E., Janssen, M. A., & Anderies, J. M. (2007). Going beyond panaceas. *Proceedings of the National Academy of Sciences*, *104*(39), 15176–15178. https://doi.org/10.1073/pnas.0701886104

Page, J. (2007). Salmon Farming in First Nations' Territories: A Case of Environmental Injustice on Canada's West Coast. *Local Environment*, *12*(6), 613–626. https://doi.org/10.1080/13549830701657349

Painted Pony Energy Ltd. (n.d). 2017 Quarterly Report (Q3) & Painted Pony Web Documents. Retrieved from: http://paintedpony.ca/investors/financial-reports/annual-reports/ Accessed on: 2017-11-10

Parfitt, B. (2017, May 3). A Dam Big Problem: Regulatory breakdown as fracking companies in BC's northeast build dozens of unauthorized dams. Retrieved May 25, 2018, from https://www.policyalternatives.ca/publications/reports/dam-big-problem

Pasternak, S. (2015). How Capitalism Will Save Colonialism: The Privatization of Reserve Lands in Canada. *Antipode*, *47*(1), 179–196. https://doi.org/10.1111/anti.12094

Peck, J. (2001). Neoliberalizing states: thin policies/hard outcomes. *Progress in Human Geography*, *25*(3), 445–455.

Pelletier, N. (2010a). Environmental sustainability as the first principle of distributive justice: Towards an ecological communitarian normative foundation for ecological economics. *Ecological Economics*, *69*(10), 1887–1894. https://doi.org/10.1016/j.ecolecon.2010.04.001

Pelletier, N. (2010b). Of laws and limits: An ecological economic perspective on redressing the failure of contemporary global environmental governance. *Global Environmental Change*, *20*(2), 220–228. https://doi.org/10.1016/j.gloenvcha.2009.12.006

Becklumb, P., Jed Chong, & Tim Williams. (2015). Shale Gas in Canada: Environmental Risks and Regulation. Retrieved February 28, 2018, from https://lop.parl.ca/content/lop/ResearchPublications/2015-18-e.html#a6

Pfeffer, J., & Salancik, G. R. (2003). *The External Control of Organizations: A Resource Dependence Perspective*. Stanford University Press.

Piper, L. (2005). [Review of *Review of Power: a Radical View (Second Edition)*, by S. Lukes]. *Theoria: A Journal of Social and Political Theory*, (108), 118–122.

Pineault, E., L'Italien, F., (2012). Se sortir la tête du sable: La contribution de la Caisse de dépôt et placement du Québec au développement des énergies fossiles au Canada. *Montreal: Institut de recherche en economie contemporaine.*

QGIS Development Team. (2017). QGIS Geographic Information System. Release 2.18. Open Source Geospatial Foundation Project. Retrieved from http://qgis.osgeo.org

Rivard, C., Lavoie, D., Lefebvre, R., Séjourné, S., Lamontagne, C., & Duchesne, M. (2014). An overview of Canadian shale gas production and environmental concerns. *International Journal of Coal Geology*, *126*, 64–76. https://doi.org/10.1016/j.coal.2013.12.004

Rodman, Lauren Sacha. (2013). Spinning wind into power : industry and energy in Gitxaała Nation, British Columbia. University of British Columbia. Retrieved from http://dx.doi.org/10.14288/1.0073866

Sapinski, J. P. (2017). Corporate Climate Policy-planning in the Global Polity: A Network Analysis. *Critical Sociology*, advanced online publication. https://doi.org/10.1177/0896920517725800

Sapinski, Jean Philippe. (2015). Climate capitalism and the global corporate elite network. *Environmental Sociology*, *1*(4), 268–279. https://doi.org/10.1080/23251042.2015.1111490

Schiffer, E. (2007). *The power mapping tool: A method for the empirical research of power relations* (IFPRI discussion paper No. 703). International Food Policy Research Institute (IFPRI). Retrieved from http://econpapers.repec.org/paper/fprifprid/703.htm

Schmidt, J. J., Brown, P. G., & Orr, C. J. (2016). Ethics in the Anthropocene: A research agenda. *The Anthropocene Review*, 2053019616662052. https://doi.org/10.1177/2053019616662052

Schmiegelow, F. K. A., & Mönkkönen, M. (2002). Habitat Loss and Fragmentation in Dynamic Landscapes: Avian Perspectives from the Boreal Forest*. *Ecological Applications*, *12*(2), 375–389. https://doi.org/10.1890/1051-0761(2002)012[0375:HLAFID]2.0.CO;2

Schneider, R., Stelfox, J. B., Boutin, S., & Wasel, S. (2003). Managing the Cumulative Impacts of Land Uses in the Western Canadian Sedimentary Basin: A Modeling Approach. *Conservation Ecology*, *7*(1). https://doi.org/10.5751/ES-00486-070108

Scott, J. (1997). *Corporate Business and Capitalist Classes*. Oxford, UNITED KINGDOM: Oxford University Press. Retrieved from http://ebookcentral.proquest.com/lib/mcgill/detail.action?docID=4964498

Seskus, T. (2018, April 9). Kinder Morgan "open to" Alberta buying a stake in Trans Mountain pipeline | CBC News. Retrieved May 26, 2018, from http://www.cbc.ca/news/business/trans-mountain-pipeline-1.4611021

Sherval, M. (2015). Canada's oil sands: The mark of a new 'oil age' or a potential threat to Arctic security? *The Extractive Industries and Society*, *2*(2), 225–236. https://doi.org/10.1016/j.exis.2015.01.011

Smil, V. (2010). *Energy Transitions: History, Requirements, Prospects*. ABC-CLIO.

Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., … Sörlin, S. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science*, *347*(6223), 1259855. https://doi.org/10.1126/science.1259855

Stephenson, E., Doukas, A., & Shaw, K. (2012). "Greenwashing gas: Might a 'transition fuel' label legitimize carbon-intensive natural gas development?" *Energy Policy*, *46*, 452–459. https://doi.org/10.1016/j.enpol.2012.04.010

Stephenson, E., & Shaw, K. (2013). ¨ A Dilemma of Abundance: Governance Challenges of Reconciling Shale Gas Development and Climate Change Mitigation. *Sustainability*, *5*(5), 2210–2232. https://doi.org/10.3390/su5052210

Stueck, W. (2018). B.C. mines to welcome foreign workers for first time since labour dispute. Retrieved from https://www.theglobeandmail.com/news/british-columbia/first-foreign-workers-expected-to-work-in-mines-since-labour-dispute/article13947995/

Svampa, M. (2013). Resource extractivism and alternatives: Latin American perspectives on development. In *Beyond Development* (pp. 117–143).

Temper, L. (2018). From boomerangs to minefields and catapults: dynamics of trans-local resistance to land-grabs. *Journal of Peasant Studies.* pg. 1-29. DOI:10.1080/03066150.2017.1398144

Trauger, A., & Fluri, J. (2014). Getting Beyond the "God Trick": Toward Service Research. *The Professional Geographer*, *66*(1), 32–40. https://doi.org/10.1080/00330124.2012.705738

Treaty 8 Tribal Association | United First Nations: Strong, Proud, and Free. (n.d.). Retrieved February 7, 2018, from http://treaty8.bc.ca/

Turner, G. M. (2014). *Is Global Collapse Imminent? An Updated Comparison of The Limits to Growth with Historical Data*.

Turner, G. M. (2008). A comparison of The Limits to Growth with 30 years of reality. *Global Environmental Change*, *18*(3), 397–411. https://doi.org/10.1016/j.gloenvcha.2008.05.001

Victor, P. A., & Rosenbluth, G. (2007). Managing without growth. *Ecological Economics*, *61*(2–3), 492–504. https://doi.org/10.1016/j.ecolecon.2006.03.022

West Moberly First Nations v. British Columbia (Chief Inspector of Mines) (BCCA May 25, 2011). Retrieved from http://canlii.ca/t/flkdx

White Jr., L. (1973). The historical roots of our ecological crisis. In *Western man and environmental ethics* (pp. 18–30).

Witter, R. Z., McKenzie, L., Stinson, K. E., Scott, K., Newman, L. S., & Adgate, J. (2013). The Use of Health Impact Assessment for a Community Undergoing Natural Gas Development.

American Journal of Public Health, *103*(6), 1002–1010. https://doi.org/10.2105/AJPH.2012.301017

Wittmer, H. U., McLellan, B. N., Seip, D. R., Young, J. A., Kinley, T. A., Watts, G. S., & Hamilton, D. (2005). Population dynamics of the endangered mountain ecotype of woodland caribou (Rangifer tarandus caribou) in British Columbia, Canada. *Canadian Journal of Zoology*, *83*(3), 407–418. https://doi.org/10.1139/z05-034

Wolfe, P. (2006). Settler colonialism and the elimination of the native. *Journal of Genocide Research*, *8*(4), 387–409. https://doi.org/10.1080/14623520601056240

Appendices:

Appendix A: additional data tables

Table 8: Number of oil and gas wells by watershed

Count of OBJECTID	Column Labels					
Row Labels	**ABAN**	**ACT**	**COMP**	**DRIL**	**SUSP**	**Grand Total**
Beaver River	6		3		2	11
Dunedin River	21	7	4		6	38
Fontas River	159	146	11		40	356
Hay River	112	494	16		45	667
Kahntah River	249	268	15		47	579
Kiskatinaw River	288	1487	64	20	193	2052
Kotcho Lake	223	271	38		57	589
Lower Beatton River	1786	1240	309	1	1151	4487
Lower Fort Nelson River	50	117	15		37	219
Lower Halfway River	279	681	85	9	237	1291
Lower Muskwa River	33	2			7	42
Lower Peace River	499	1288	93	7	318	2205
Lower Petitot River	111	159	16		36	322
Lower Prophet River	44	14	1		7	66
Lower Sikanni Chief River	269	201	48		85	603
Middle Fort Nelson River	100	51	11		45	207
Middle Muskwa River	3					3
Middle Prophet River	67	15	7		24	113
Milligan Creek	667	444	86		373	1570
Murray River	97	219	16		60	392
Peace Arm	4				1	5
Pine River	93	446	16	2	77	634
Sahdoanah Creek	185	393	29		173	780
Sahtaneh River	222	510	33	1	60	826
Shekilie River	96	179	18		64	357
Smoky River	80	345	27		48	500
Toad River	1					1
Tsea River	169	169	39		80	457
Upper Beatton River	671	1013	163	4	417	2268
Upper Fort Nelson River	77	198	11		28	314
Upper Halfway River	43	23	10		28	104
Upper Liard River	1					1
Upper Muskwa River	4					4
Upper Peace River	389	405	71	4	223	1092
Upper Petitot River	37	46	9		31	123
Upper Prophet River	25	17			8	50
Upper Sikanni Chief River	188	536	51	2	189	966
Grand Total	**7348**	**11384**	**1315**	**50**	**4197**	**24294**

Table 8 shows the number of wells by watershed. The headings are ABAN for abandoned wells, ACT for active wells, COMP for wells that have recently completed drilling, DRIL for wells actively being drilled, and SUSP for wells that have been suspended. The last column has the total number of wells per watershed.

Table 9: global distribution of oil and gas ownership links

Country	Number of Ownership Links	% of total
Canada	173	36.7
USA	186	39.5
Other	112	23.8
Total	471	100

Table 9: has the aggregated data for the number of ownership links connecting companies in Canada, the United States, and elsewhere to the 20 core oil and gas companies operating on Treaty 8 territory in BC.

Table 10: Major Owners

CONNOR, CLARK & LUNN FINANCIAL GROUP LTD
T ROWE PRICE GROUP INC
FRANKLIN RESOURCES INC
POWER CORPORATION OF CANADA
PROVINCE OF QUEBEC
CI FINANCIAL CORP
ROYAL BANK OF CANADA

Table 10 lists the 7 companies with 5% ownership stakes in companies listed in both the major projects and oil and gas data sets. These companies have significant financial interest in Treaty 8 region and sufficient ownership concentration to be able to directly influence resource extraction and company operations on Treaty 8 territory.

Appendix B: Chi Squared Tests and Beta-centrality reference tables

Table 11: Chi-Squared test for national affiliations in Canadian Juniors Girvan-Newman community

Table 11 Countries Group:	2	3 df			
	A	B	C	D	Totals
Observed #	42	1	0	16	59
Expected #	28.2535211	7.47887324	6.09389671	17.1737089	59
O-E	13.7464789	-6.4788732	-6.0938967	-1.1737089	3.5527E-15
(O-E)2	188.965681	41.9757985	37.1355772	1.37759263	
(O-E)2/E	6.68821704	5.61258322	6.09389671	0.08021521	18.4749122
			R from CHISQ.TEST fcn:		0.00035099

A = Canada,
B = USA
C = Other Country
D = No data

Table 11 is the first of 6 significant chi-squared tests assessing the uniqueness of the communities detected using the Girvan-Newman community detection algorithm. Table 11 tests whether there is a significant national identity to the Canadian Juniors community. Companies listed in Canada are counted in column A, companies listed in the USA are counted in column B, companies listed outside of North America are counted in column C, and companies for which no data was available are listed in column D.

Table 12: Chi-squared test for industry affiliations in Canadian Juniors community

NACE Categories			df 10	Group:	2
	Observed #	Expected #	O-E	(O-E)^2	(O-E)^2/E
B	35	18.2816901	16.7183099	279.501885	15.2886239
C	2	9.14084507	-7.1408451	50.9916683	5.57844137
0	12	17.1737089	-5.1737089	26.767264	1.55861871
D	2	3.04694836	-1.0469484	1.09610086	0.35973726
M	0	0.55399061	-0.5539906	0.3069056	0.55399061
G	1	1.10798122	-0.1079812	0.01165994	0.01052359
K	6	4.98591549	1.01408451	1.02836739	0.20625448
H	0	2.21596244	-2.2159624	4.91048954	2.21596244
F	1	0.83098592	0.16901408	0.02856576	0.03437575
J	0	1.38497653	-1.3849765	1.91815998	1.38497653
N	0	0.27699531	-0.2769953	0.0767264	0.27699531
Totals	59	59			27.4684999

R From CHISQ.TEST fcn: 0.00219466

Table 12 assess the industry composition of the Canadian Juniors community. The Nomenclature of Economic Activities (NACE) code for each company were used to classify companies by industry sector. The companies in category B are part of the mining and quarrying industry, this includes natural gas extraction. The companies in category C are manufacturing firms, category D is the commercial sale of electricity and gas, category F is construction, G is wholesale retail and trade, H is transportation and storage, J is information and communication, K is financial and insurance activities, M is research activities, N is administration and support activities.

Table 13: Chi-Squared test for national affiliations in the Conoco and co. Girvan-Newman community

Countries Group:	3	3 df			
	A	B	C	D	Totals
Observed #	0	10	3	2	15
Expected #	7.18309859	1.90140845	1.54929577	4.36619718	15
O-E	-7.1830986	8.09859155	1.45070423	-2.3661972	0
(O-E)2	51.5969054	65.5871851	2.10454275	5.59888911	
(O-E)2/E	7.18309859	34.494001	1.35838668	1.28232622	44.3178125
			R from CHISQ.TEST fcn:		1.2919E-09

Table 13 tests the national affiliations for the Conoco and co. community. The Companies listed in Canada are counted in column A, companies listed in the USA are counted in column B, companies listed outside of North America are listed in column C, and companies for which no data was available are listed in column D.

Table 14: Chi-squared test for industry affiliations in the Conoco and Co community

NACE Categories			df 10	Group:	3
	Observed #	Expected #	O-E	(O-E)^2	(O-E)^2/E
B	1	4.64788732	-3.6478873	13.3070819	2.86303884
C	9	2.32394366	6.67605634	44.5697282	19.1784891
0	2	4.36619718	-2.3661972	5.59888911	1.28232622
D	0	0.77464789	-0.7746479	0.60007935	0.77464789
M	0	0.14084507	-0.1408451	0.01983733	0.14084507
G	1	0.28169014	0.71830986	0.51596905	1.83169014
K	1	1.26760563	-0.2676056	0.07161278	0.05649452
H	0	0.56338028	-0.5633803	0.31739734	0.56338028
F	1	0.21126761	0.78873239	0.62209879	2.94460094
J	0	0.35211268	-0.3521127	0.12398334	0.35211268
N	0	0.07042254	-0.0704225	0.00495933	0.07042254
Totals	15	15			30.0580482
			R From CHISQ.TEST fcn:		0.00083811

Table 14 assess the industry composition of the Conoco and co community. The Nomenclature of Economic Activities (NACE) code for each company were used to classify companies by industry sector. The companies in category B are part of the mining and quarrying industry, this includes natural gas extraction. The companies in category C are

manufacturing firms, category D is the commercial sale of electricity and gas, category F is construction, G is wholesale retail and trade, H is transportation and storage, J is information and communication, K is financial and insurance activities, M is research activities, N is administration and support activities.

Table 15: Chi-Squared test for national affiliations in Murphy co. Girvan-Newman community

Countries Group:	5	3 df			
	A	B	C	D	Totals
Observed #	1	7	0	2	10
Expected #	4.78873239	1.26760563	1.03286385	2.91079812	10
O-E	-3.7887324	5.73239437	-1.0328638	-0.9107981	0
(O-E)2	14.3544932	32.8603452	1.06680773	0.82955322	
(O-E)2/E	2.99755592	25.9231612	1.03286385	0.28499167	30.2385726

R from CHISQ.TEST fcn: 1.2294E-06

Table 15 tests the national affiliations for the Murphy co community. The Companies listed in Canada are counted in column A, companies listed in the USA are counted in column B, companies listed outside of North America are counted in column C, and companies for which no data was available are listed in column D.

Table 16: Chi-Squared test for national affiliations in the multinational Girvan-Newman community

Countries Group:	6	3 df			
	A	B	C	D	Totals
Observed #	3	2	13	2	20
Expected #	9.57746479	2.53521127	2.0657277	5.82159624	20
O-E	-6.5774648	-0.5352113	10.9342723	-3.8215962	0
(O-E)2	43.263043	0.2864511	119.558311	14.6045979	
(O-E)2/E	4.51717067	0.11298905	57.8770913	2.50869302	65.0159441

R from CHISQ.TEST fcn: 4.9768E-14

Table 16 tests the national affiliations for the multinational community. The Companies listed in Canada are counted in column A, companies listed in the USA are counted in column B, companies listed outside of North America are counted in column C, and companies for which no data was available are counted in column D. Note: the communities were named after the chi-squared tests were conducted, in these tables the communities are simply represented by a group number.

Table 17: 20 highest beta-centrality scores for the oil and gas inter-corporate ego-network.

	Company Name:	Beta-Score
1	IBM	471.082
2	GE COMPANY	394.873
3	BOEING COMPANY (THE)	306.418
4	CHEVRON CORPORATION	254.027
5	ROYAL DUTCH SHELL PLC	205.29
6	GENERAL MOTORS COMPANY	200.968
7	MARSH & MCLENNAN COMPANIES INC	200.194
8	SHELL DEUTSCHLAND OIL GMBH	182.98
9	CD Howe Institute	179.416
10	SHELL TRADING INTERNATIONAL LIMITED	172.91
11	UNITED TECHNOLOGIES CORPORATION	166.62
12	BROOKFIELD ASSET MANAGEMENT INC	164.18
13	SHELL EASTERN PETROLEUM (PTE) LTD	151.07
14	SHELL EASTERN TRADING (PTE) LTD	143.21
15	Business Council of British Columbia	140.435
16	ENTERGY CORP	131.037
17	BANK of NOVA SCOTIA (THE) - SCOTIABANK	128.738
18	BARRICK GOLD CORPORATION	126.633
19	Business Council of Canada	126.199
20	ASSOCIATED ELECTRIC & GAS INSURANCE SERVICES LTD - AEGIS	124.644

Table 17 lists the top 20 companies from the oil and gas network as measured by their beta-centrality score. Three of the entries belong to industry associations and think tanks, suggesting that policy plays an important role in creating cohesion between companies.

Appendix C: Community Report

Summary of Corporate Power on Treaty 8 Territory in Northeastern British Columbia

Presented to

Keepers of the Water

Prepared by

Emery Hartley

September 2018

Table of Contents

List of figures:

Introduction:

From November 2016 to June 2018 I worked on corporate maps of Treaty 8 territory in northeastern British Columbia. Corporate maps track companies operating in an area and their relationships to other companies. I hope the research can help increase the understanding of how corporations and the international corporate community control and profit from the resources on Treaty 8 territory.

To better understand corporations driving resource extraction the research studies both companies extracting oil and gas as well as companies proposing major projects. The oil and gas research focused on the 20 most active oil and gas companies operating on Treaty 8 territory in BC for the year 2017. Additional data was collected on 15 major projects proposed for the region. Major projects are listed in British Columbia's economic atlas and include wind farm proposals, power line expansions, and major mine proposals.

The research is summarized in 5 briefs presented to Keepers of the Water. The complete research and methods can be found in Hartley (2018) with additional sources listed throughout. The briefs include a summary of industrial impacts (Brief 1), the social network connecting oil and gas extraction companies (Brief 2), and how profits from extraction are internationally distributed (Brief 3). Additionally, included are a summary of the strategic implications of this research (Brief 4) as well as a discussion of corporate power and influence (Brief 5).

Brief 1: Distribution and Impacts of Resource Extraction on Treaty 8 Territory (BC region)

Natural gas by the numbers:
As of February 2018 there were 11384 active oil and gas wells in British Columbia. All of these are on Treaty 8 territory, with most of them concentrated over the Montney basin. Natural gas extraction requires lots of water; there are 3159 legal water extraction sites that allow natural gas operators on Treaty 8 territory to take water from rivers and other natural water sources to supply their hydraulic fracturing operations. Natural gas extraction often causes air pollution. There are 5000 square kilometers of Treaty 8 territory where air quality is likely impacted by oil and gas wells.

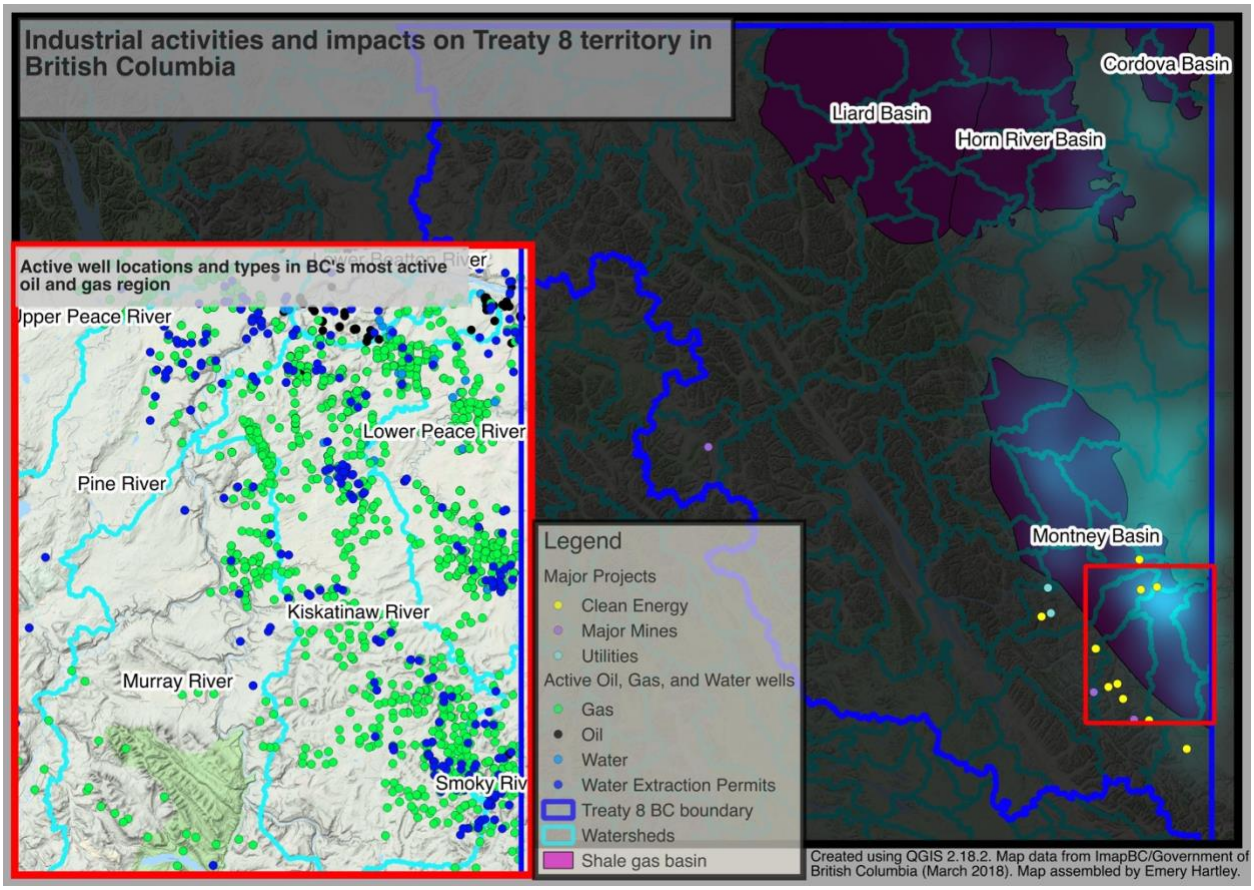

Figure 5 - Map of industrial impacts on Treaty 8 territory in BC

Map: showing the relative density of oil and gas wells as well as specific locations of major projects. The heat map (light blue areas on the right of main map) regroups 32705 well sites, including decommissioned, suspended, and abandoned wells to give an impression not only of current environmental liabilities, but also historically incurred environmental debts. The concentration of wells is represented by the intensity of the light blue shading. The purple outline encompasses recognized Treaty 8 territory in British Columbia, while the light blue outlines depict sub-basin watersheds (50,000ha-500,000ha in size). On the main map there are markers for the major projects reviewed in this study. The yellow dots are for "clean energy" including wind farms and hydroelectric projects. Light purple makers indicate mines, both hard-rock and coal, while the light blue dots indicate major utilities projects (power line expansions).

The inset in the map shows active drilling sites and active wells in the Kiskatinaw River watershed, this is the watershed with the most active well sites in British Columbia. The green dots are natural gas extraction wells, the black dots are oil wells, and the blue dots are water injection sites for disposal of fracking fluids. The purple markers on the inset indicate water extraction permits, many of which will be used to supply water for hydraulic fracturing.

5 watersheds with the most active oil and gas wells:	**5 watersheds with the most water extraction permits:**
Kiskatinaw River (1487 active wells) Lower Peace River (1288 active wells) Lower Beatton River (1240 active wells) Upper Beatton River (1013 active wells) Lower Halfway River (681 active wells)	Sahdoana Creek (212 permits) Lower Beatton River (203 permits) Lower Fort Nelson River (198 permits) Pine River (196 permits) Milligan Creek (179 permits)

Cumulative impacts:

Treaty 8 has abundant natural resources. In addition to oil and gas, companies mine coal, gold, silver, and copper from the area. Treaty 8 is also central to British Columbia's energy grid, with two major BC hydro dams and a third under construction along the Peace River. The region also houses the largest wind farm in BC and has one third of all potential wind energy identified by BC Hydro. There is also industrial logging throughout the region. Treaty 8 Nations have widely criticized the BC government for failing to manage the combined impacts of all these industrial extraction activities.

Understanding industrial impacts:

Corporations drive resource extraction through investment, their access to technology, and engagement with government regulators. This brief is part of a research project focused on detailing the network of companies driving extraction on Treaty 8 territory. The research focuses on the 20 most active oil and gas extraction companies in BC as well as a number of companies driving other types of resource extraction, including development of wind farms and coal mines.

Avenues for action:

The map of industrial activity and details of the watersheds with the most wells can help identify priority areas for conservation actions as well as communities that would benefit most from educational materials about the effects of oil and gas extraction. There is a wide body of research detailing the impacts of oil and gas extraction on people and the environment that can be used to create educational materials. The Industrial Activities map can be presented to Treaty 8 communities to raise awareness about the extent and nature of industrial activities in the territory.

Brief 2: Intercorporate Network: Natural Gas Companies and Their Community

What is an Intercorporate Network?

Companies are connected by their directors. Company directors often have directorship roles on 2 or more companies. These directors create a link between each of those companies. The sociogram bellow shows all the links between companies created by overlapping directors, starting from the twenty most active oil and gas extraction companies operating in BC in 2017. The sum of the connections created between different companies by directors is called an intercorporate network.

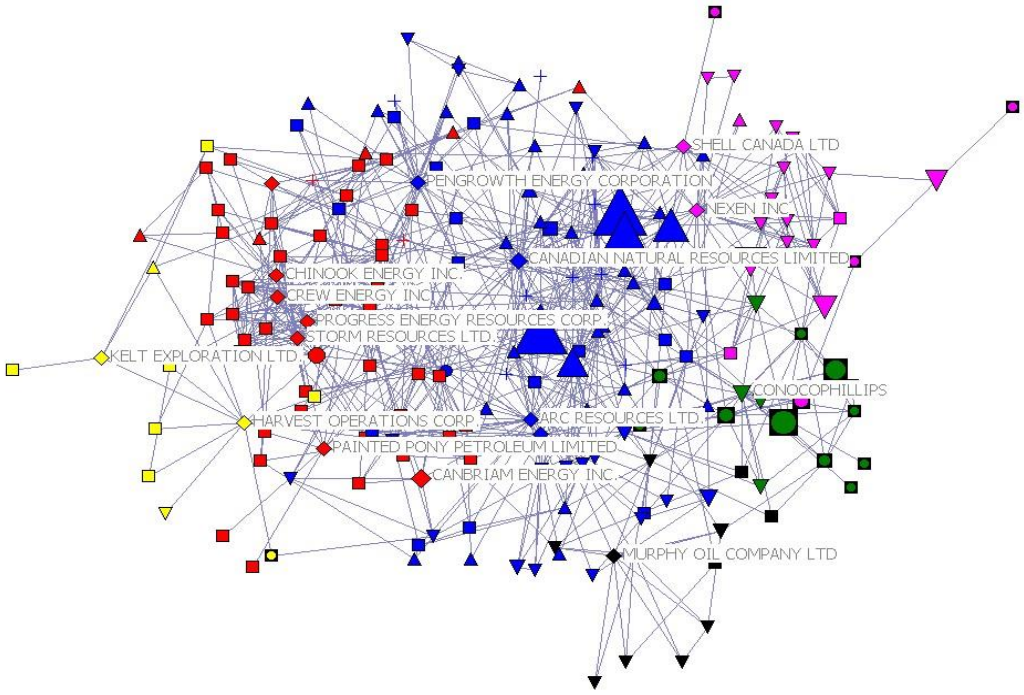

Figure 6 - Intercorporate network of most active oil and gas extractors

Figure: A sociogram showing the intercorporate network of the most active oil and gas companies operating on Treaty 8 territory during 2017. The companies used to build the network are labelled. The colours represent sub communities identified through analysis. The shapes represent industry classifications, with diamond shaped dots being the core-sample companies and triangles representing the finance sector. Squares are oil and gas extraction companies and squares with a circle inside are manufacturing firms. The relative size of each point represents the total assets of each company.

Intercorporate Networks and Fossil Fuel Extraction:
The network shown here tracks the intercorporate network of the 20 most active fossil fuel companies operating in BC in 2017. All the companies are connected to each other, forming part of a single community of companies interested in profiting from the extraction of fossil fuels from Treaty 8 territory.
The network of shared directors can allow corporations to communicate between each other, provide a means for coordination between corporations, and provides a mechanism to explain why different corporations support the same government and policy reforms (Brownlee 2005). Corporations that are connected through a network are better able to work towards shared interests. Corporate networks consolidate power.

Where is the corporate network based?
Most fossil fuel companies in Canada are based in Calgary. Calgary has become the industrial center for regulating fossil fuel extraction in Canada. Companies and directors in that city play a central role in mediating the industry. The large triangles in the figure above are finance companies. The majority of the finance companies engaging in fossil fuel extraction are based in Toronto. The community of extractors highlighted in blue are closely connected to some major banks including TD bank and RBC. The links between oil and gas extractors and the finance industry create an axis between Calgary and Toronto that directs and profits from most fossil fuel extraction in Canada (Carroll 2017).

Key takeaways:
The sociogram above shows the links between different companies. Within the network there are groups of companies that have more in common and are more closely connected. Networks of companies are useful for understanding the preferences of companies. A single unified network suggests that fossil fuel extractors will have shared policy preferences and try to influence communities, decision makers, and government in a way that benefits resource extraction across the industry. A few additional highlights on the network can be found bellow. A full discussion can be found in Hartley (2018).

Canadian Juniors sub community (red):
The group of companies highlighted in red has been called the “Canadian juniors” group. Most of these companies specialize in the extraction of natural gas and oil. They are responsible for a lot of the resource exploration and extraction that happens on Treaty 8 territory. However, they only receive a small portion of all the profits generated by the fossil fuel industry (Carroll 2017). The companies in this group are very dependent on links to other companies for market access, project financing, and technical expertise outside of extraction. The reliance on other companies and outside experts may present points of intervention to challenge the extractors in this group.

Linking sub community (purple):
The group of companies highlighted in purple are called the “linking” community. This group contains the largest Canadian fossil fuel extraction companies, including Encana, CNRL, and ARC resources. This community also contains the major banks (RBC, TD, etc) and other finance and insurance companies. This community plays an important role in bridging the interests of the

fossil fuel extraction companies with the interests of other major Canadian corporations. Additionally, these major players concentrate most of the wealth generated from the extraction and sale of fossil fuels in Canada (Carroll 2017). The members of this community are important to know because they are some of the most influential companies in Canada, mediating relationships not just to other companies but also to key decision makers and regulators. A full list of this sub community is available from the author.

Multinational sub community (pink):

The group of companies in pink are called the "multinational" community. These companies have headquarters outside of North America. The multinational community demonstrates the interest of foreign corporations and nations in profiting from extraction in Canada and securing access to resources on Treaty 8 territory. Importantly, the multinational community has the ability to significantly influence the Canadian corporate community. Measures of corporate influence indicate that the companies in the multinational community are very influential in the fossil fuel extraction community in Canada. Campaigns such as the Sacred Headwaters campaign lead by the Klabona Keepers have successfully influenced multinational extractors operating in Canada before. Being able to leverage or influence one of these companies may create a ripple effect throughout the corporate community profiting from Treaty 8 territory.

Avenues for action:

The intercorporate network shows that there are many existing ties between resource extraction companies that can lead to cooperation, provide communication, and lead to shared policy preferences between companies. The network suggests that natural gas extraction companies should be dealt with as an industry rather than individual companies. Members of the extractive community should be considered as having shared preferences for influencing resource extraction and governance on Treaty 8 territory. There are some opportunities to introduce dissension within the groups or cause network wide shifts by focusing communication with key individual members of the sub-communities.

Brief 3: Global Ownership of Extraction on Treaty 8 Territory

Why does corporate ownership matter?

The profits from extraction go to a company's owners. Publicly traded companies are owned by shareholders. The only obligation of a company is to maximize the profits of its shareholders. Shareholders are also the ultimate decision makers in a company, with the ability to change company management, provide new funding, or recall financial tools such as securities. Many companies today are not owned by private individuals but by other companies or institutions. Corporate owners who buy shares in companies operating on Treaty 8 territory have an incentive to monitor and influence the management and extraction of Treaty 8 resources.

Oil and gas ownership by the numbers:

19 of the companies studied had publicly available shareholder information. From 19 companies conducting natural gas extraction on Treaty 8 territory there are 470 ownership claims by other companies. Only 36.7% of the owners are based in Canada, another 39.5% are based out of the USA, while the remaining companies are based internationally.

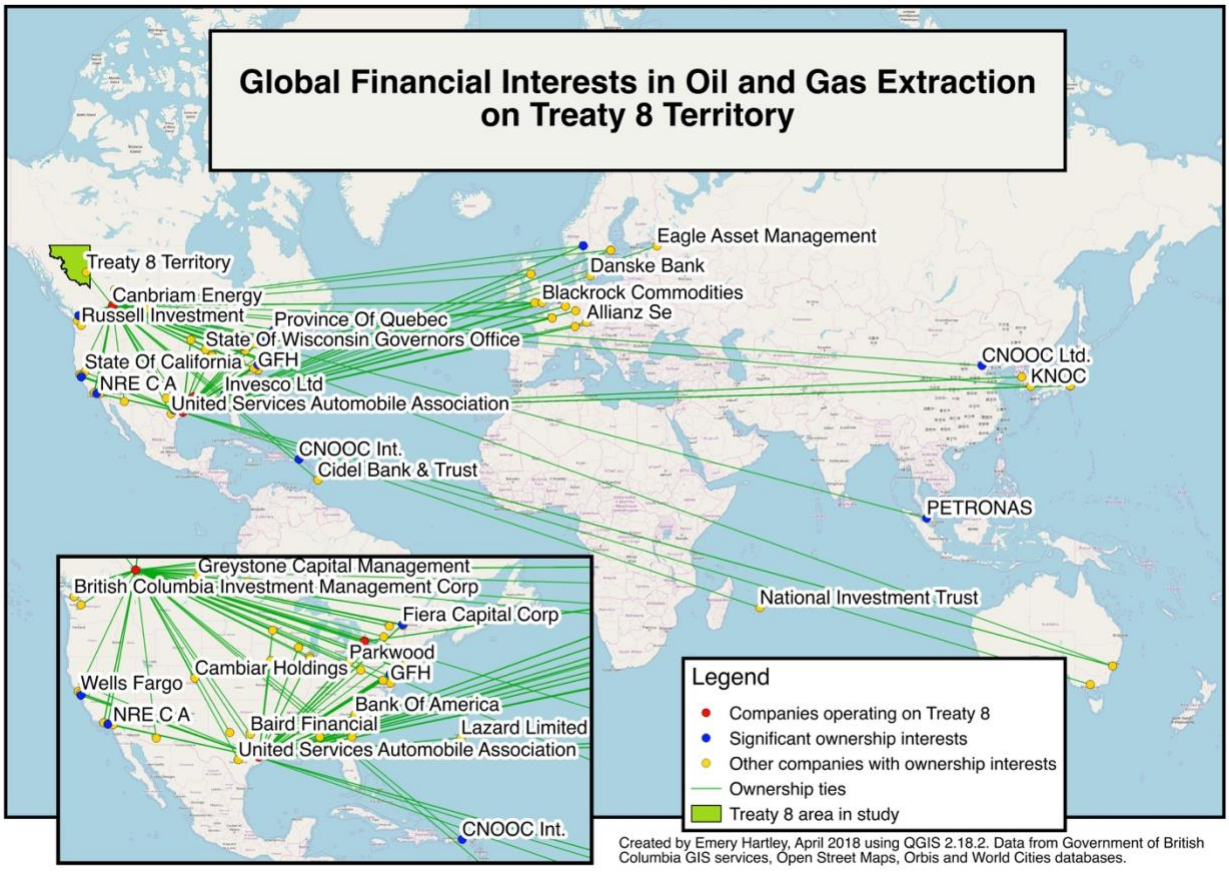

Figure 7 - Global distribution of oil and gas ownership

Map: The geographic distribution of ownership interests directing extraction of oil and gas on Treaty 8 territory (BC). The red dots are the corporate headquarters of the 20 most active gas extraction companies operating in 2017. The green lines link these centers of extraction to their domestic and foreign ownership interests, whose headquarters are marked with yellow and blue dots. Almost all extraction in Treaty 8 territory is mediated through Calgary with only a few operations mediated from Toronto and the USA.

Ownership of major projects:

The government of BC tracks project proposals valued at over 15 million dollars in an aptly named "major projects" economic atlas. In this study there were 15 major projects proposed for Treaty 8 territory in BC. They were proposed by 13 parent companies. Many of the major projects were proposed by limited partnerships created solely for the project. Limited partnerships allow companies to combine expertise, resource rights, and funding from different partners into a single legal entity. Eight of the parent companies of the limited partnerships were publicly traded or wholly owned subsidiaries of publicly traded companies. There were 263 ownership ties to these eight companies, and 183 unique shareholders. Thus 30.4% of the ownership ties link owners to profits from multiple projects in the Treaty 8 region. 20.5% of the owners are listed in Canada, while another 43% are listed in the USA. The remaining 36.5% are distributed across another 18 countries.

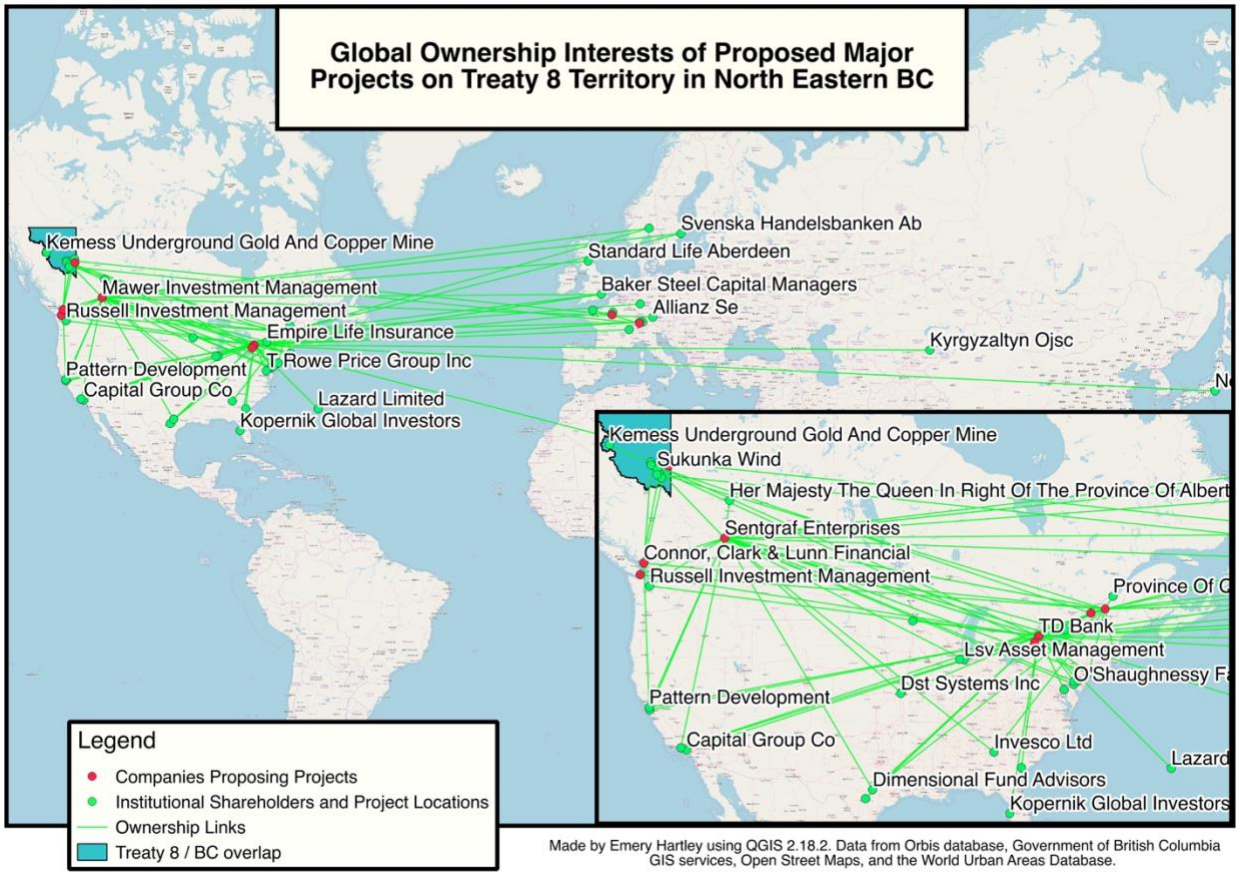

Figure 8 - Global distribution of major projects ownership

Map: The "Global Ownership Interests of Proposed Major Projects on Treaty 8 Territory in Northeastern BC" map shows the global distribution of ownership interests in projects costing more than 15 million dollars proposed for Treaty 8 territory in BC. The data was restricted to projects that are not directly related to fossil fuel extraction, though two projects proposed by BC Hydro and ATCO energy are primarily geared towards electrifying natural gas pumping and compression stations. There are 13 direct owners of projects in BC (red dots), but 183 corporate shareholders (light green dots outside of the Treaty 8 region).

Corporations and 21st century colonialism:
Resource extraction companies manage and extract resources on Treaty 8 land. Increasingly, these companies are also responsible for negotiating access to resources with First Nations. Impact Benefit Agreements, compensation packages, and training and work opportunities are just some of the agreements negotiated in order to access First Nations lands. By negotiating resource access, companies guarantee their owners profits from the resources extracted on Indigenous territory. The patterns of ownership seen for both the oil and gas companies and the major projects being proposed clearly mirror colonial power. Ownership of resource extraction today reproduces the historical power distribution associated with colonization, with the primary beneficiaries of extraction located in eastern Canada, eastern USA, and western Europe.

Controlling a corporation through ownership:
Corporate ownership matters because owners can control company management. In publicly traded companies owning as little as 5% of a company's stock can be enough to exert effective control over that company. On Treaty 8 territory there are 34 companies that can exert effective control over both oil and gas companies and major projects on Treaty 8 territory (see Brief 4 for a complete list). These major owners are heavily invested in extraction on Treaty 8 territory and should be considered actors with special interest in protecting profits from the region.

Corporate interests based on types of ownership:
Corporate owners have interests. The corporate owners of extraction operations on Treaty 8 territory can be divided into different interest groups, highlighting possible alliances between corporations. Groups of owners can form and pursue goals based on shared business types.

Banks are one of the largest groups of corporate owners today, they are interested not only in profiting from extraction but in financing company growth.

Governments also own resource extraction projects. Government ownership can include politically motivated ownership such as the recent acquisition of the Kinder Morgan pipeline, ownership through nationally owned corporations such as China's National Overseas Oil Corporation (CNOOC Ltd), and through government pension funds. Each type of government ownership is a tool for a domestic government to influence resource development, while for foreign governments they become tools for guaranteeing resource access.

Wealth management firms and investment advisors are another group of corporate owners, they are primarily interested in profiting through shares dividends and increases in a company's stock value. These companies will mostly exert influence on management by buying a single individual or family. Such private equity firms tend to practice very active management, including pumping funds into a company to help it deal with a financial crisis. Power-corporation is one of the most influential private equity firms in Canada.

Lastly, pension funds represent an important group of corporate owners because they have some democratic controls built into them, especially those run by Unions. Activist pension funds can change the way resource extraction is done. Depending on the reforms being sought activist pension funds can present potential allies for Indigenous actors.

Avenues for action:
Corporate owners are the ultimate beneficiaries of extraction on Treaty 8 territory and resource extraction companies are directly accountable to them. Additionally owners with significant investment in companies operating on Treaty 8 may seek to influence the extractive environment on Treaty 8 territory, including environmental regulations, labour protocols, and financial incentives. Understanding the interests of company owners can help predict what they want in negotiations and how they may try and influence public policy. Long term tracking of major investors in the Treaty 8 region should be a priority for understanding resource extraction and development in the region. Additionally, activist pension funds are potential allies for Indigenous groups looking to establish contacts with regional ownership interests.

Brief 4: Specific Lessons on Corporate Power in Treaty 8 Territory

Corporate mapping provides broad information about the extent and nature of corporate power. The mapping approach used in Hartley (2018) also includes specific details of companies operating on Treaty 8 territory. This brief outlines some companies with special relationships that may have strategic implications. Next, this brief presents a list of companies with significant financial interest in the region that should be considered potential political actors. Finally the brief closes with a discussion of a simple financial measure that can be used to strategically assess companies.

Instrumental Links:

Some connections within an intercorporate network are more significant than others. Directors who negotiate contracts, agreements, or transactions between companies they are associated with create "Instrumental links" between those companies. There are a number of instrumental links in the intercorporate network explored in Brief 2.

Painted Pony and AltaGas:

Painted pony is an oil and gas extraction company. They operate primarily in BC and are focused solely on exploration and extraction of oil and gas. They rely on other companies for pipelines to sell their gas to other industries. AltaGas is affiliated to Painted Pony through one of its directors. The shared directorship is reflected by a strategic alliance between AltaGas and Painted Pony that guarantees Painted Pony market access through the AltaGas pipeline system and additional processing capacity through AltaGas' processing plants. An instrumental link such as this can be a foundation for future cooperation between the companies.

Chinook Energy and Storm Resources:

Chinook Energy and Storm Resources are part of a tight knit group of oil and gas juniors focused on extraction in BC. They were created in 2010 after Storm Ventures International sold a large part of its business to ARC Resources Ltd. Currently these companies are focused on the Montney shale area but are planning on drilling wells in the Horn River basin when the price of dry gas climbs. These companies share several directors and have very low company debt compared to their assessed values. Both these companies are well positioned to rapidly expand their extraction operations.

Companies such as Storm Resources and Chinook Energy accrue capital to the same group of individuals. While their management teams remain closely linked, do not expect their approaches to resource extraction do differ significantly. In 2017 Chinook Energy had 13 operational wells, two of which were on hold because the Chinook Energy compression facility was too small to process the additional natural gas. Small scale operators like Chinook and Storm are often limited by market access and processing capacity. The close network of natural gas extraction companies around Chinook and Storm suggests that there is a group of investors and managers in Calgary that are highly motivated to extract natural gas in BC. Familiarity with the directors of these companies may be useful as they seem to have a long history of exploration in the region and an interest in continued profit from Treaty 8 in BC.

Major Owners:

There are some companies that are more heavily invested in Treaty 8 territory than others. The companies listed below have ownership interests in both major projects such as mines and wind farms, as well as in oil and gas extraction. These major players control significant allocative power in Treaty 8 region and have the ability to influence several types of extraction. Expect corporations owning shares in multiple companies operating on Treaty 8 territory to exert political pressure over extraction in the region. The companies listed are categorized by type of commercial ownership and colour coded by country. Canadian companies other than the equity management firms are the most likely to act politically and strategically to protect resource access on Treaty 8 territory in British Columbia.

List of Major Owners by Type of Corporation:

Below is a list of the 34 companies with interest in both major projects and oil and gas extraction. Five categories are used to differentiate between the different types of ownership interests. Colours are used to differentiate between Canadian and international ownership. Blue names are Canadian based Owners. Green names are US based owners. Purple names are based outside of the US and Canada.

Equity Management Firms

- BlackRock Inc.
- Charles Schwab Corporation
- Dimensional Fund Advisors
- FMR LLC
- Investco Ltd
- Legg Mason Inc
- Northern Trust Corporation
- Russell Investment Management LLC
- SEI Investments Co
- State Street Corporation
- Vanguard Group Inc.
- Wellington Management Group LLC
- AGF Management Ltd
- Capital Group
- CI Financial Corp.
- Connor, Clark & Lunn Financial Group
- Franklin Resources Inc.
- Lazard Limited

Holding Companies

- Power Corporation of Canada

Government Investment

- British Columbia Investment Management Corporation
- Province of Quebec
- Norway Sovereign Wealth Fund
- Regeringskansliet (Sweden)

Finance Companies (Banks, Insurance, etc)

- Bank of New York Mellon
- JP Morgan Chase & Co.
- Bank of Montreal
- Canadian Imperial Bank of Commerce (CIBC)
- Manulife Financial Corp
- Royal Bank of Canada
- Toronto Dominion Bank
- Axa SA
- Investec PLC
- UBS Group

Pension Funds

TIAA Board of Overseers

ARC Financial:
ARC financial is the largest private equity manager in Canada. They invest exclusively in fossil fuel extraction and energy infrastructure outside of the Alberta tar sands. Because they focus solely on fossil fuels they do not appear on the list of major owners above. ARC invests in "equity opportunities", often gaining a seat on a company's board as part of a 50-200 million dollar investment. ARC has ties to many of the fossil fuel companies operating in BC and is constantly looking to finance expansion in the area. They are an important actor and can directly influence or even exert allocative power over a number of natural gas extractors in the region.

Corporate Debt:
Debt is a powerful determinant of corporate behavior. By taking on debt, corporations can expand their operations and finance new purchases. There are several measures of debt that can be calculated from publicly available company documents, including annual financial reports. One measure is calculated by dividing a company's total debt load by the total value of the company's assets (called equity), this is called the Debt/Equity ratio. In this research I found the Debt/Equity ratio to be very useful. Statistics Canada provides an average Debt/Equity ratio for each industry. Comparing a company's Debt/Equity ratio to the industry average can signal if a company has too much debt or is positioned to take on more debt. One example to highlight the power of calculating the debt/equity ratio is the example of Pengrowth Energy. In 2017 the D/E ratio for Pengrowth Energy was 1.6, more than twice as high as the national industry average (0.7). The high Debt/Equity ratio suggested that Pengrowth Energy was in financial trouble, and indeed, the company's financial plan for 2017 included the sale of 827 million in company assets in order to reduce the debt load by 66%. Debt/Equity ratios can provide a means of selecting companies that are financially vulnerable to external pressure or changes in their operating environment.

Brief 5: Power and Influence on Treaty 8 Territory - a primer on corporate power

What is Corporate Power?

Power is the ability to affect someone or something against their interests. Corporate power comes from a company's ability to control money, physical assets, technology, and labour. What companies can't control with corporate power they will try to influence. Influence includes cooperation and alignment between companies, working with government, interactions with communities and community organizations, and providing information and experts to the media.

Types of Power:

Corporate power can be categorized into strategic power, allocative power, and operational power.

Strategic power is control over a company's direction. Strategic power is exercised by the board of directors but is heavily influenced by the companies operating environment, including availability of money, the resource base available to the company, legislation and regulations around the company's operations, public good will, and financial forecasting.

Allocative power is control over the flow of money. Banks, investors, and managers control allocative power. Allocative power can be influenced by profit projections, business debt load, and changes in the investment climate (eg. Interest rates and returns on money invested).

Operational power is control over day to day operations. Exercised by managers, it is readily challenged and disrupted by unions and direct-action tactics.

Types of Influence:

Corporate influence in a community relies on a corporation's direct power as well as indirect means of communication. Direct power such as control over employment, the ability to launch law suits, and monetary contributions to community charities are all tools used by corporations to influence public opinion and community dialogues. Additionally, corporations use communication to control the information environment around key issues. Corporations will participate publicly in media dialogues but will also try to provide experts for conversations with the media through connections with think tanks. Corporate influence can also include access to government officials and local decision makers. Though corporations may not have direct control over these people, priority access can ensure that corporate opinions are presented before and more frequently than others.

Stronger Together:
The networks presented in Briefs 2 and 3 show how corporations are connected to each other. Corporate networks become important tools for amplifying corporate voice and representing corporate interests. Through ownership and intercorporate networks, corporations develop shared positions around broad public policy. These networks can also facilitate the coordination of regional interests. Notably 3 of the 20 most influential members of the intercorporate network are not corporations but public policy organizations, including the Business Council of British Columbia. These 3rd party groups can represent industry without the apparent conflict of interest associated with self-advocacy from fossil fuel corporations. Corporate networks increase corporate influence and are central to understanding how corporate power is exercised in Canada and across Treaty 8 territory.

Avenues for action:
Power is most effective when it is un-observed (Piper 2005). Revealing and talking about corporate power can be a first step to disrupting it, especially when immediate concerns are corporate influence over a community or governance process. Corporations will seek to control information around issues that affect their operations, providing independent science is an important response to their efforts. Additionally, showing how corporations try to influence communities can help highlight the divide between community and corporate interests.

Allocative power can be challenged if the conditions for loans are put into question. Arthur Manuel once used Canada's historic and outstanding debt to First Nations to argue that Canada's credit rating should be downgraded. The companies listed in Brief 4 exercise significant allocative power on Treaty 8 territories. Influencing such major owners could have dramatic consequences for regional extractors.

Strategic power can be influenced by changes to the legal conditions surrounding extraction. Currently there is a reduced royalty area on the Montney Shale, this has become an operational focus for several companies in the region including Painted Pony. Changes in BC's royalty policy will influence future strategic decisions by these resource extractors.

Lastly, operational power has always been a point of conflict with industry. Environmental actions, protests, union job action, injunctions halting construction; all are examples of tools for disrupting the exercise of operational power. Disrupting operational power can also be a means of undermining allocative power by reducing the cash flow of an operation. Threats of direct action and disruption of operations can increase anticipated project costs and impact the business case for major projects.