EXAMINING DISTRIBUTION AND CONCENTRATION OF ACCESS IN BRITISH COLUMBIA'S SALMON AND HERRING FISHERIES

by

Andrea Rae Haas

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Abstract

There is a growing awareness of the need to incorporate social goals into fisheries management, alongside ecological and economic aspects. Distribution of fisheries resources is increasingly included in social objectives of equity and fairness, such as those outlined in the 2003 FAO Technical Guidelines for Responsible Fisheries. Concentration of fisheries access is an important aspect of distribution of benefits from the resource, and in Pacific Canada, the fish processing industry was limited to 12% ownership of fishing assets in the late 1970s. With that in mind, this thesis addressed the current extent of concentration of fisheries licenses in the Pacific salmon and herring fisheries, and examines trends in concentration over the past twenty years. Previous studies have assessed 'corporate' concentration only through vertical integration, whereby a fish processor owns the fishing license. However, this thesis develops more comprehensive criteria for inclusion in this category that included those who hold licenses but do not operate the asset ("license investors"), in addition to assessing other group's license ownership patterns. Fisheries license data were obtained from Canada's Department of Fisheries and Oceans (DFO), while data on fish processing licenses were obtained from the British Columbia Ministry of Agriculture. From these data sets, four different license owner types were identified: fish processors, "license investors", Aboriginal (or First Nations) groups, and independent owner-operators. Corporate records from the Statistics Canada Inter-Corporate Ownership data and the British Columbia Corporate Registry Services were obtained to track subsidiary operations and amalgamations or dissolutions, and then cross-referenced with the DFO license lists. The license lists were then analyzed for changes in the percent holding by these groups over the twenty-year period using a relational database. The results reveal that concentration is increasing in the fisheries examined, and proportionally, fish processors have

exceeded their limits on fisheries license ownership in some fisheries since the earliest years under investigation here. As well, more subtle forms of fisheries license concentration may be occurring through "license investors". Finally, the implications of the findings are discussed in the wider context of fisheries sustainability, with some recommendations for addressing distribution of fisheries access going forward.

Preface

This thesis was designed as part of a project within the Canadian Fisheries Research Network (CFRN), which is research collaboration among the fishing industry, relevant government researchers and managers, and academia. The project was designed in collaboration with the United Fishermen and Allied Workers Union (UFAWU), The Canadian Council of Professional Fish Harvesters (CCPFH), and the TBuck Suzuki Environmental Foundation. Data was provided for this thesis by relevant government authorities on request from the author. Fishing industry collaborators assisted the author in making reasonable and appropriate assumptions for the data analysis regarding fishing industry operations. An academic member of the CFRN provided technical support for the design and operation of the database used. The author conducted all literature reviews, data analysis, and writing. This research was also presented at the International Institute of Fisheries Economics and Trade conference in Brisbane, Australia on the 8th of July, 2014.

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Chapter 1: Introduction

1.1 Why we should examine distribution and concentration

Control of global resources has become a subject of substantial debate in recent years. In September of 2011, a crowd of protesters gathered in New York City near Wall Street to protest socioeconomic inequality, both in the United States and worldwide. Distribution of wealth and resources is a concern for policy makers because of its effects on social welfare, and therefore governance. It is argued that distribution "is one of the most enduring practical problems of human societies" (Coulter, 1989, p. 2). There is even emerging evidence that inequality has implications for health and life expectancy (Underwood, 2014). While the issue gains interest, both politically and academically, it still remains a difficult question to address because comprehensive methods (and the data required by them) are often lacking (Mervis, 2014).

1.2 Context

Distributional issues in fisheries are no different. Issues surrounding allocation and access to the resource are prevalent in many fisheries management regimes (Clark, 2006), and sometimes fishers have resorted to the courts to settle their grievances over allocation issues (which will be briefly detailed in Chapter 2). Marine fisheries require management of access and allocation in one form or another because of the open access nature of the resource. Economically speaking, so long as the private benefits of exploiting the resource outweigh the private costs of doing so, there remains an incentive for new entrants to enter the fishery, exploit the resource (sometimes detrimentally), and dissipate the benefits received (Gordon, 1954).

In many developed nations, fisheries management consists of some type of control on the inputs into the fishery, and outputs from the fishery. Examples of inputs are the permissible gear, seasons, areas, and times, whereas outputs may be in the form of the total catch of fish extracted. Another increasingly considered inclusion in the fisheries management portfolio is marine reserves, which are designed to act as a buffer against any management uncertainty and potential failure (Clark, 2006), as happened with the cod collapse in Atlantic Canada (Lauck, Clark, Mangel, & Munro, 1998). Chapter 2 discusses how the implementation of certain fisheries management and policies may lead to concentration of access of the fisheries resource. As this thesis focuses on fisheries in Pacific Canada, Chapter 2 focuses on input and output controls, as they most closely relate to the management styles used in Canada.

1.3 Motivation for research, and objectives

A recent report by the Commissioner of the Environment and Sustainable Development, Canada, points to equitable distribution of access as one of the properties of a sustainable fishery (Office of the Auditor General of Canada, 2011), something that has been echoed on a global scale by the Food and Agriculture organization of the United Nations (UN FAO, 2003). The policies and some significant legal precedents during the course of Canada's fisheries history have helped pave the road to the current state of management. Policies, such as those to avoid concentration (specifically, "owner-operator" policies) in Atlantic fisheries, were not applied in the Pacific fisheries. Instead, Pacific Canada's fishing industry was limited on the amount of concentration that occurred, which was set at 12% ownership of vessels (Shaffer, 1979). Input and output controls seem to have improved economic outlooks overall for several Canadian fisheries where

they have been applied (Munro, Turris, Clark, Sumaila, & Bailey, 2009), however the *distribution* of those economic gains has been controversial.

Academics are becoming increasingly aware of the need for a greater spectrum of objectives in fisheries management, some of which are related to distribution of fisheries access and the benefits from that access. This has highlighted a gap in the current research regarding Canada's Pacific fisheries. As the issue of equitable distribution of access (and hence the benefits from the resource) becomes a more salient indicator of sustainability, then what is the current extent of concentration in Canada's Pacific fisheries? Furthermore, has this changed over time? Concentration in one Pacific fishery was reviewed briefly in 1996 by other authors, however that publication was almost twenty years ago, and contained insufficient empirical analysis to address the question thoroughly. Additionally, while common measures of industrial concentration exist, this thesis aims to use practical data and more comprehensive approaches to assess distribution of access to the fishery.

This thesis will examine the Pacific salmon and herring fisheries specifically, due to their economic and cultural significance to the region. Chapter 2 will outline how the application of certain fisheries policies can lead to concentration of the benefits of the resource, and then provide an overview of the management of the Pacific salmon and herring fisheries. Chapter 3 will detail how the user groups (processors, "license investors", Aboriginal groups, and independent owner-operators) were identified based on the licensing data available, and how concentration and distribution was assessed. It will also detail the results of the findings, and discuss these in the broader context of the current state of the fisheries in question. Chapter 4

will elaborate on the implications of the finding in the wider setting of fisheries sustainability, and for future fisheries policies. As well, Chapter 4 will discuss the limitations of the research, and where future studies may be able to ameliorate the challenges encountered here. It is hoped that this research will help guide policy-makers in future decisions regarding the distribution of fisheries access rights in the future.

Chapter 2: Fisheries management, the potential for concentration of access, and a review of salmon and herring policy

2.1 Major fisheries management approaches and how they can affect concentration in the fishery

Some degree of concentration has existed in Canada's Pacific fisheries since at least the late-1970s (Shaffer, 1979), however its current extent is undocumented. In some cases, fisheries allocation and access policy has been designed (with a view of efficiency) to deliberately reduce the number of participants in order to relieve pressure on the resource and enhance the viability of the remaining fishers (Parsons, 1993; Healey, 1993). In other cases, the concentration of access and allocation may have been an unintended consequence of fisheries policy aimed at economic efficiency (ARA Consulting Group Inc., 1996). Overall, the subject of concentration in fisheries is a highly topical, and yet a highly controversial matter. This chapter aims to address general fisheries management approaches, and where concentration may have the potential to take place within those management measures.

2.1.1 Open access and common pool fisheries

In open access fisheries, access to the fishery and its resources is open to all. It is widely believed that open access fisheries have lead to over-exploitation of the resource and dissipation of the profits or 'rents' that each individual receives (The World Bank, 2009), in line with what Garrett Hardin described as the "Tragedy of the Commons" (Hardin, 1968). Concentration of fisheries access in the hands of a few is rarely a problem in these situations; quite the opposite, the situation tends to be that fisheries access is completely 'diluted', so to speak. Although

Hardin used the phrase "commons", his article described an open access resource, and Bromley (2008) points out that the confusion between *res nullius* (open access) and *res communis* (common property) continues to this day. The Nobel-winning economist, Elinor Ostrom, pioneered a great deal of work on "common pool" resources (Ostrom, 1990), which are often governed by a community or a group, and therefore regulations and rules can exist in these types of fisheries to avoid overexploitation and manage the fisheries public resource. An example of this is detailed in the book "The Lobster Gangs of Maine" (Acheson, 1988), who designed their own regulations, rules, and territories not recognized by management authorities, and were successful at protecting the resource from overharvesting. A key to the success in managing common pool resources is the ability of participants or players to manage their use of the resources cooperatively (e.g. Munro 1979; Sumaila 1999, 2013; Bailey, Sumaila, & Lindroos, 2010).

2.1.2 Input controls

In order to curb the over-exploitation of the resource, fisheries managers sometimes aim to regulate the fishing effort. One way is through "input controls", because the inputs into the fishery, which affect the exploitation rate, are the item being regulated (Walters & Martell, 2004). For example, this may be restrictions on the number of licenses, gear that may be used (hook-and-line versus nets) or it may be a time restrictions or area closures (Walters & Martell, 2004). In some way, either the capital or labor into the fishing activity is restricted. In the case of limiting entry through the requirement of a permit, the goal is to restrict the input of labor in the fishing activity. A basic economic concept of scarce resources is that they have value; when permits are no longer limitless (they become scarce), they grow in value. Fishing licenses had

been shown to become increasingly valuable after the number was limited in the Pacific salmon fishery, with those already holding licenses having improved financial outcomes from the change in policy; fishers who entered after the number of licenses were restricted were not as fortunate (Parsons, 1993). This is because the fishers who held licenses at the time the policy was implemented had lower fixed costs (in the form of purchase of the license) than fishers who wanted to enter the fishery later in time. This can create inter-generational distribution problems as the 1st generation of fishers (those fortunate enough to hold a license when they were restricted) receives "windfall profits" (Scholz, Tamm, Day, Edwards, & Steinback, 2004), and 2nd generation fishers (those wishing to enter after) may not. The theory behind the manifestation of concentration of fisheries access (for the purposes of this research project, "access" is synonymous with a fishing license) follows here. Due to higher fixed costs (more valuable licenses) associated with entering the fishery after license limitation, some new entrants may be unable to raise the capital for the purchase of the license, largely because lending institutions have not viewed licenses as secure assets, and choose to lease the license from an existing holder instead. If there are no policies preventing this practice, then the existing holder of the license may derive profit from a license they do not operate – a practice known widely as "armchair fishing". Because armchair fishers can devote energy to other income practices, as well as deriving income from license leasing, they can acquire capital for the purchase of another license more easily than the individual who pays a lease fee to operate a license. Licenses can have provisions attached to them that reduce the potential for concentration to occur, such as owner-operator provisions whereby the owner of the license is required to be the operator of the license as well. These provisions will be discussed in following sections.

2.1.3 Output controls

An output control differs from an input control in that, rather than restricting the inputs to the fishery, such as gear, vessels, licenses, etc., the output (the catch) is what is now restricted (Walters & Martell, 2004). Once abundance of the resource and its anticipated recruitment (new fish of catchable size) is estimated, managers set an amount of that biomass that can be taken (Walters & Martell, 2004), known as the Total Allowable Catch (TAC). Setting a TAC creates competition among fishers to acquire as much of the catch as possible before the TAC is reached. This is a form of "regulated" open access, whereby managers aim to control the TAC without restricting the size or power of the fleet (Greboval & Munro, 1999). This can lead to "capital stuffing", which is the enhancement of a vessel's catching power and inevitably, a share of the catch (Clark, 2006). The competition to secure as much of the catch as possible before reaching the TAC creates situations described as "derby" or "Olympic" style fishing (McCay, 2004; Munro et al., 2009). In British Columbia's halibut fishery, this situation led to a season that became shorter and shorter due to the TAC being reached sooner and sooner, and was only six days long in 1990 (Grafton, Squires, & Fox, 2000).

2.1.4 Catch-shares

Catch-shares have become an increasingly popular method of managing fisheries, both in developed and developing nations (Libecap, 2009; Jardine & Sanchirico, 2012). These programs operate under the design of managers setting a maximum catch (the TAC), and then dividing up the TAC amongst eligible fishers, typically only those who hold a permit or license to fish (Iudicello, Weber, & Wieland, 1999; Sumaila, 2010). One form of catch-shares is individual quotas, more specifically "individual fishing quotas" (IFQs), "individual transferable quotas"

(ITQs) which can be traded amongst fishers, or "individual vessel quotas" (IVQs) which are assigned to a fishing vessel and may or may not be transferable, depending on the restrictions or regulations attached to them. Catch-shares are primarily an economic tool and can have environmental or social problems associated with them, such as high-grading (throwing away less valuable fish so that the quota can be met with high value fish), and inequitable distribution of benefits (Pálsson & Helgason, 1995; Copes & Charles, 2004; Karlsdottir, 2008; Sumaila, 2010). Other forms of catch-shares programs include community quotas, whereby the quota is allocated to the community rather than the individual. For example, Alaska's Community Development Quota (CDQ) for 7.5% of the TAC for walleye pollock (*Theragra chalcogramma*) goes to communities with development plans (Ginter, 1995). The CDQ groups are able to fish after the regular fishery season is closed to others, allowing them to capitalize on low supply/high demand situations that generate better revenues. Revenues generated are used to promote economic development of the remote communities, many of which have high Aboriginal populations (Ginter, 1995). Another form of a catch-share is territorial user rights in fisheries (TURFs), which are a share of the space of the fishery rather than the catch (Jardine & Sanchirico, 2012).

The ITQ has been the most frequently used program, which in theory allows less efficient operators to self-exit the fishery by selling their shares to more efficient enterprises, which could be other harvesters, or even fish processors aiming to secure supply. Catch-shares programs have much of their genesis in the need to reduce the over-capacity of fishing fleets (Grafton, 1996), and eliminate "derby" style fishing practices that reduce the economic viability and safety of the fleets under limited entry licensing programs and TACs alone (Casey, Dewees, Turris, &

Wilen, 1995). It is becoming widely accepted that these programs have been effective in reducing capacity, and generating improved economic rents in the fishery (Sporer, 2001; Munro et al., 2009; Grimm, et al., 2012), however their design may have had unintended distributional consequences. Brandt (2005, p. 16) summarized this well in noting that while individual transferable catch-shares have "produced gains in the *aggregate*, this fundamental debate over the *distribution* of gains from increased efficiency, and losses from restructuring, remains a persistent debate" (emphasis in original).

2.1.5 Specifics of catch-shares and concentration

The theory about how concentration of quotas takes place is somewhat similar to the case of licenses: more cost-effective (or "efficient") operators are able to earn more profits. Less efficient operators can exit the fishery by selling their shares to those more efficient operators. The more efficient harvesters are now able to catch more fish with their additional shares, and use any profits to continue to purchase more shares from others. In the economic theory that production requires labor and capital, accumulating capital (the quotas) will increase production (in theory, and only to a point). Some authors have noted that some degree of consolidation is to be expected when catch-shares are instituted to rationalize a fishing fleet, and therefore normal under these programs (Gauvin, Ward, & Burgess, 1994; Connor, 2001; Sumaila, 2010).

When discussing the issue of concentration of catch-shares (referred to hereafter as "quota") in fisheries, the initial allocation of shares is arguably one of the most frequently arising issues. Often, the initial allocations in an ITQ fishery have been given to the fishers *gratis* (free of purchase, auction or royalties). Bromley (2008, p. 13) criticizes the free initial allocation

process, claiming that this "free gifting of the wealth of ocean fisheries" is what most acutely brings about the redistributive aspects. Pinkerton and Edwards (2010) claim that it is this free allocation of quotas that can create wealth and income effects because the fishers who receive them did not have to purchase them in the first place. Anderson (1991) notes that initial allocations are often given out based on historical catches, rather than for reasons of efficiency, and Grafton (1996) points out that this method aims to address fairness and equity, as a means of recognizing historical participation in the fishery. However, if fishers are aware in advance that allocations will be given based on past catches, it can also create problems of overfishing and vessel growth in anticipation of the allocations to come (Bromley, 2008). Authors have argued for the auctioning of quotas (Libecap, 2009) or for fishers to pay royalties on their share of the catch (Bromley, 2008), but note that this has not been done in the past due to opposition from the fishing industry who naturally oppose fees after previously having freer access, but whose compliance is most needed when initially introducing quota programs. In the state of New South Wales in Australia, Young (1995) describes the design of the state's ITQ program and how the fisheries were subjected to royalties of 2.5% of their shares that were to be returned to the community, or alternatively, offered up for sale at auction. Furthermore, 15% of each fisher's catch-share was offered up for public sale at specified points in the management timeline, with the option of the fisher to purchase it back if they so pleased. Young describes these "zero-revenue auctions" as a means of avoiding excessive concentration of quotas by influencing fishers to carefully consider what value they place on their access rights by asking them to buy it back.

While initial allocations can set the stage for concentration (by making some operators more "efficient" due to the size of their allocation), transferability of quotas can play a role in concentration in fisheries as well. Clark (2006) has outlined several problems regarding transferability of fishing rights and catch-shares. If quotas can be transferred to a non-fisher, there may be opposition because this allows the owner of the quota to profit without the work of harvesting the catch (the so-called "armchair fishing" or "armchair fishermen", as previously described). Due to the increasing prices of licenses and quotas, only those with access to sufficient amounts of capital are able to purchase the quota outright. Clark notes that fishers will be required to lease the quota with the profits accumulating to the owner, with potential concentration of ownership following. Stewart, Walshe, and Moodie (2006, p. 331) noted that small-scale fishers were likely to be "price takers" (as opposed to price *makers*) in the lease markets for quotas. McCay (1995) argues that consolidation of quotas can also create situations whereby the bargaining power of the lessor of any quota would be greatly reduced in relation to the lessee.

Concentration can also occurs if there are barriers to entry in the industry. A barrier to entry is described as "factors that impede or prevent the entry of new firms into an industry" and is recognized in four different forms: 1) economies of scale; 2) government-imposed restrictions, as in those on foreign investment and tariffs; 3) product differentiation, and; 4) absolute cost advantages arising from resource control, acquisition of capital, and vertical integration (Royal Commission on Corporate Concentration, 1978). Like fishing licenses, quotas are not seen as secure assets that lending institutions will register a lien on (at least in Canada), and therefore access to capital to purchase quota may have the potential to be a barrier to entry for some

participants, necessitating quota leasing. Rising lease prices of quota can reduce crew shares of the profits once the lease fee is deducted from the catch (Pálsson & Helgason, 1995; Scholz et al., 2004; Karlsdottir, 2008; Pinkerton & Edwards, 2009). This latter point became so prominent in Iceland that strikes amongst fishers broke out in 1994, 1995, and 1998 over the matter, and eventually led to the country's Quota Exchange Market (a "stock-market like" mechanism for quota exchange) being developed (Eythórsson, 2000, p. 488). Other authors have pointed out that leasing of the quota in the fishery is precisely what *reduces* the barriers to entry for participants not able to purchase the quota (Turris, 2010; Stewart & Callagher, 2011), although it is recognized that vessels which lease quota are indeed less profitable than those who do not (Turris, 2010).

Small rural fishing communities and First Nations may be facing particularly complex challenges with accessing capital for license or quota purchase. Scholz et al., (2004) point out that with the high value of quotas created at initial allocation, two related problems are created for these stakeholder groups: firstly, because the value of a home can be used as equity for the purchase of a license and quota, people in small rural communities with low home value are usually not able to access large enough home equity to purchase quota, and banks will not loan new entrants the funds required for the purchase of quota because they cannot register a lien on it (Turris, 2010). Secondly, many First Nations individuals living on reservations do not have the same level of

property rights over their homes[1], and therefore are also denied this means to quota ownership (Scholz et al., 2004).

2.2 Management approaches applied in Canada, and specifically British Columbia

The previous sections have outlined major fisheries management approaches, and how they have the potential to affect concentration of the access to, and allocation of, the resource. The following sections will address management approaches currently used in Canada, the historical context of their use, and relevant legal precedents that helped shape the current state of fisheries management.

2.2.1 Limited entry licensing in Canada: the "Davis Plan", and LeBlanc's "fleet separation" and "owner-operator" policies

2.2.1.1 The Pacific

In the Pacific, as early as 1948 the United Fisherman and Allied Workers Union (UFAWU) had been pressing the Canadian Government's Department of Fisheries and Oceans (DFO[2]) to limit the amount of licenses. This was partly due to conservation (made more salient by the Pacific herring collapse in the late 1960s), partly due to income preservation, and partly due to hostility on the part of full-time fishers towards those they perceived as less personally invested in fishing

[1] First Nations people who live on reservations do not have fee simple ownership of their homes. This means that the Crown (for the use and benefit of First Nations peoples) owns the land, and it cannot be sold to anyone else outside of the band for profit unless the First Nation's interest in the land is surrendered to the Crown. For further details, see the Government of Canada's Indian Act, online at: http://laws-lois.justice.gc.ca/eng/acts/i-5/index.html [accessed June 8, 2014].

[2] While the name has changed several times over the decades, being at some points in time under the Ministry of Environment as the Marine Fisheries, the Department of Fisheries and Oceans Canada was officially established in on April 2, 1979, and will be henceforth referred to as "DFO" throughout this thesis.

as an occupation (Gough, 2007). Due to disagreements between DFO and the fishing industry on the details of license limitation programs (namely, if the license was to be attached to the vessel or the person), it took almost 20 years before these management actions came to fruition (Gough, 2007). In 1969, under Minister of Fisheries Jack Davis, DFO began limited entry licensing in the Pacific salmon fishery as a vessel-based license, and it was noted by Shaffer (1979, p. 44), "With the license limitation program, outright ownership of salmon vessels by processing companies was limited to 12% of the fleet." Several other fisheries followed such as halibut in 1979 and sablefish in 1981, but salmon was one of the first comprehensive applications of this policy. The policy was aimed at increasing fisher's incomes, reducing overcapacity, and reducing the number of vessels (Healey, 1993; Parsons, 1993). The "Davis Plan" (as it became to be known) had secondary objectives of reducing financial hardship among the harvesters and dampening their dislocation while achieving its primary goals (Healey, 1993). The plan had four main phases: 1) freeze fleet size; 2) gradually reduce fleet size; 3) upgrade and maintain remaining vessels; and, 4) implement gear and area licensing (Healey, 1993; Parsons, 1993). The gear and area licensing never came about as part of the "Davis Plan", but were implemented many years later (further discussed in following sections). As noted earlier, the UFAWU had stressed that limited entry licenses should go to a person rather than the vessel and be non-transferable, arguing that if the owner (of the vessel) received the revenue from the sale of a license, crew who had spent many years in the fishery would be disadvantaged, as well as, among other things, making the fleet vulnerable to control by the large fish processors (Gough, 2007). Davis had stressed that vessel-based licensing was instituted to control fleet size, but was aware that the policy changes would increase license value. Pearse (1972, as cited in Parsons, 1993) felt that the program would not be sufficient in controlling overcapacity due to increasing

technology, and it would discriminate against operators with few other options; later analyses found that these suppositions had some merit (Pearse, 1982; Parsons, 1993).

In the roe herring fishery, limited entry licensing had been implemented in 1974. The "Davis Plan" had three objectives here: 1) ensure the fleet stayed below levels which might jeopardize the fish stock; 2) ensure that financial returns from the fishery were viable for fishers to cover costs; and, 3) provide rents to the Crown (Parsons, 1993). While the licensing plan here permitted entry by all applicants, the 'limitation' was expected to happen through higher than normal license fees; when applications finally closed there were almost six times more gillnet licenses than before the program (Parsons, 1993). Under insistence from the UFAWU, Davis did attach the licenses to the person rather than the vessel with an owner-operator provision (Gough, 2007). However DFO mandated that this would apply only to new license holders and not previous ones, making enforcement confusing and difficult (especially during the boom years of the herring fishery in the late 1970s), and the owner-operator rule was thrown out in 1979 (Parsons, 1993; Gough, 2007). Due to the initial application process, Pearse (1982) drew similar conclusions in this fishery about the limited entry licensing program's failure to reduce fleet overcapacity.

2.2.1.2 The Atlantic

In an effort to reduce over-capacity in the Atlantic lobster fleet, limited entry licensing was also established in1969 with the classes of licenses and trap limits designed largely in an attempt to reduce the participation of those less personally invested in fishing (Parsons, 1993). Ultimately, limited entry licensing began to grow in the Atlantic, with herring in 1970 (Stephenson, Lane,

Aldous, & Nowak, 1993), and groundfish in 1974 (Parsons, 1993). By 1982, limited entry licensing was in place in all fisheries in Atlantic Canada (Parsons, 1993). In 1974 Roméo LeBlanc, a reputed "friend of the fishermen[3]" became Fisheries Minister, and DFO continued with several other significant policy reforms. In 1977, LeBlanc proposed the idea of protecting independent fishers from processing companies by ensuring that processors were not allowed to buy boats less than 65ft in length. This was due to an influential rumor circulating at the time regarding how large vertically-integrated processors were paying exaggeratedly low prices to their fishing sectors, intentionally creating profit losses and tax write-offs, with the low (ex-vessel) prices paid depressing prices to all, including independent fishers (Gough, 2007). To that end, LeBlanc instituted the "separate-fleet" (also know as the 'fleet separation') policy in 1979, and although it allowed for grandfathered clauses and exemptions, it became almost universal in the Atlantic fisheries. It effectively banned processors from owning fishing vessels in the inshore fleet (Gardner, 1995), by requiring boats less than 65ft in length to have the license holder operate the vessel (Fisheries and Oceans Canada, 2003). Although early in the policy's evolution it was implied that the license holder *own* the vessel, this was eventually loosened to allow the license holder to operate someone else's vessel (Gough, 2007). The "owner-operator" policy made its way into Atlantic fisheries over time, but was widely adopted by 1996 when the Commercial Fisheries Licensing Policy for Eastern Canada (Fisheries and Oceans Canada, 1996) was developed. For whatever reason, fleet-separate and owner-operator rules were never applied in Pacific Canada.

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[3] The Governor General of Canada (2009). *"The Right Honourable Romeo LeBlanc."* Retrieved from: archive.gg.ca/gg/fgg/bios/02/index_e.asp [accessed January 30th, 2014].

2.2.2 The Sparrow and Marshall decisions – Aboriginal stakeholders in the fishery

Fisheries management in Canada cannot be discussed in isolation without noting two of the most important legal cases that set a precedent for Aboriginal stakeholders in the fisheries. Aboriginal peoples had already organized into a group (The Native Brotherhood of British Columbia) to further their interests in the fishery by working in conjunction with the UFAWU on bargaining agreements in the salmon and herring fisheries (Sinclair, 1960). The case of Ronald Edward Sparrow however redefined Aboriginal rights to fish in Canada. Sparrow, from the Musqueam band in British Columbia, had been charged with fishing with an improperly sized net that was disallowed under his band's fishing license. In 1990, after a lengthy legal process that went all the way to the Supreme Court of Canada, the judge determined that Aboriginal peoples had "a constitutionally protected priority over the rights of other people engaged in fishing" (*R. v. Sparrow*, 1990) under the Constitution Act 1982, rather than just the privileges afforded under a fishing license issued by DFO. Following this historic case, DFO created the Aboriginal Fisheries Strategy (Fisheries and Oceans Canada, 2012), which changed how allocations for many fisheries licenses and quota were undertaken.

Expanding the Aboriginal position in fisheries, in 1993 Donald Marshall of the Membertou band of Nova Scotia had been charged with selling fish commercially that he had caught for his personal use. The Supreme Court of Canada declared in 1999 that Aboriginal peoples had a right to sell the fish they had caught commercially in order to earn a "moderate livelihood" (*R. v. Marshall*, 1993), setting a precedent that would ensure that First Nations people were included in the benefits of fisheries access. DFO had already begun the Allocation Transfer Program in 1994 to address First Nations rising demand for commercial fishing licenses (The Cohen

Commission, 2010), but also initiated the Pacific Integrated Commercial Fisheries Initiative (PICFI) in 2007 to – *inter alia* - provide funding to commercial harvesters that wanted to give up their licenses, with the eventual transfer of those licenses to First Nations fishery participants (Fisheries and Oceans Canada, 2013a).

The Sparrow decision ensured that First Nations had a constitutionally protected right to fish for Food, Social, and Ceremonial (FSC) purposes (termed "First Nations allocations" in many of the Integrated Fisheries Management Plans - IFMPs - published by DFO), and the Marshall decision advanced First Nations desires to participate in the commercial fisheries (termed "commercial" allocations in the IFMPs). Harvests by First Nations peoples for the purposes of FSC are given priority by DFO, and operated under "communal" licenses, whereas commercial harvests by First Nations are similar in nature to other commercial licenses, but may have provisions such as "reduced fee, "band held", "non-transferable", "transferable", and others attached to them (Jones, Shepert, & Sterritt, 2004).

2.2.3 Catch-shares in British Columbia's fisheries

Several of British Columbia's fisheries are managed under catch-shares, most notably halibut, sablefish, the groundfish trawl, geoduck, and herring (which will be discussed in the following sections). Most of these have been in place since the late 1980s and early 1990s, but some were in place almost a decade earlier.

2.2.3.1 Halibut

As noted earlier, British Columbia's halibut (*Hippoglossus stenolepis*) fishery was previously managed under limited entry licensing and TACs alone, aggravating the race to fish and reducing the season only six days long in 1990. When ITQ's were introduced in 1991, initial allocations were based on a formula whereby 70% of the allocation was to come from the landings in the past four years of the fishery (from 1986-1989), and the other 30% was to be dictated based on vessel length (Sporer, 2001). In a study by Munro et al., (2009), it was demonstrated that quota management reduced the TAC overages in the fishery and substantially increased the length of the season (and hence product quality). Grafton et al., (2000) describe how the B.C. halibut fishery individual vessel quotas (IVQs) were made non-transferable during a two-year introductory period, after which they became transferable; with many restrictions on transferability, the maximum proportion of the TAC that the vessel with the largest four shares could hold would only be approximately 1.5% of the TAC. Furthermore, it seems that the overcapacity in this fleet was only finally brought under control when the transferability of the quota was allowed two years after its introduction (Munro, 2001). Also noted by Munro et al., (2009) was the steadily increasing value of the licenses and the quotas in the halibut fishery; in 2005 a halibut license was valued at over $1 million, and the quota was valued at $77/kg. In a survey of fishers in BC's halibut fishery, the respondents felt as though the IVQ program initiated there in 1991 created barriers to entry for the younger fishers in their industry (Casey et al., 1995).

Quotas are often not auctioned because this would create legal grounds for fishers to seek compensation if their quotas were reduced, due to measures such as conservation or reallocation

among sectors. This issue came into sharp focus in 2013 with the case of a halibut fisher who sued the government (specifically DFO) because 3% of the commercial fishery's halibut quota was reallocated to the recreational sector (*Malcolm v. Canada*, 2013). The Federal Court of Appeal ruled that quotas did not constitute property rights, and therefore were revocable without compensation. The situation regarding fisheries *licenses* is slightly different. Although the case of *Saulnier v. Royal Bank of Canada* (2008) comes from the Atlantic coast, its ruling remains extremely salient; the case dealt with property rights of fisheries access in the context of the Bankruptcy and Insolvency Act. The Supreme Court of Nova Scotia had handed down judgment regarding fisheries access as a property right, and had determined that "The grant by the Minister of a license, coupled with a proprietary interest in the fish caught…" (*Saulnier v. Royal Bank of Canada*, 2008) did indeed constitute a property right.

2.2.3.2 Groundfish

The British Columbia groundfish trawl fishery became a limited entry licensed fishery in 1976. As with halibut, much of the same "derby" style fishing occurred over the following years. To complicate matters, the multitude of species caught in the fishery meant that the TAC of some species was reached before those of others, and would have prompted a closure of the entire fishery (which lead to a great deal of misreporting and discarding) (Munro et al., 2009). To this end, the groundfish trawl fishery implemented catch-shares in 1997 with allocations based largely on historical catch records. All fifty-five species had a TAC and a quota, and transferability of these shares allowed harvesters to stay within the TACs if they had captured too much of one species, or too little of another. Additionally, 20% of the TAC was set aside as a Code of Conduct Quota, and Groundfish Development Quota to be allocated to groups who

submitted plans with objectives geared to regional development, employment, fair treatment of crews, and safety (Turris, 2000). The licensing and catch-share regime in this fishery appears to have improved conservation and economic outcomes for the existing participants.

2.2.3.3 Geoduck

The Canadian Pacific geoduck (*Panope abrupta*) fishery was a notable deviation from the pattern of an allocation formula. Instead of the quotas being allocated based on historical catches or vessel lengths, each of the 55 license holders was given an equal allocation of the TAC when this fishery moved to catch-shares in 1989 (Khan, 2006). Initially, only the licenses were transferable (the quota could not be divided from the license), however this policy was relaxed in 2012, and allowed each license holder's $1/55^{th}$ of the TAC to be divided up further into tenths, making the shares in the fishery now $1/550^{th}$.

2.3 British Columbia's salmon and herring fisheries

This section aims to outline the how these fisheries operate, and a brief overview of the policies and management that has taken place over their history.

2.3.1 Pacific salmon

The history and management details of the salmon fishery are extremely complex, evolving largely because of the need to strike a balance between biological and economic objectives. It is beyond the scope of this chapter to cover them all, however this section will attempt to provide a brief overview of how the salmon fishery operates.

Aboriginal fisheries for Pacific salmon have existed for thousands of years in British Columbia and colonial commercial fisheries had begun as early as the late 17th century and into the mid 18th century (Gough, 2007). Salmon are an anadromous species, and return to their natal streams to spawn every two to five years, depending on the species. There are five species of Pacific salmon (*Oncorhynchus spp.*) that comprise the fishery: pink (*O. gorbuscha*), chum (*O. keta*), coho (*O. kisutch*), chinook (*O. tshawytscha*), and sockeye (*O. nerka*). Sockeye salmon is by far the most economically valuable of these species and accounts for over 50% of landed value of the fishery in many years (Pearse & McRae, 2004), and accordingly DFO has accounted for catch of the other four species in terms of "sockeye equivalents" (Fisheries and Oceans Canada, 1999). When limited entry licensing was introduced in 1969, category "A" licenses were for fishers who met a threshold amount of historical landings, category "B" licenses were for those who did not ("B" licenses were not to be replaced when the vessel they were issued to was retired). License types were A (suffix S for seine vessels, which were permitted to use gillnet and troll gear in addition to their seine nets), and AC for combined troll and gillnet gear (but not seining) (Shardlow, 1988; Grafton & Nelson, 2007), and fishing was permitted coast-wide. At this time, the salmon fishery was much more inclusive; a category A or AS license permitted the harvest of a great many other species alongside salmon, but have subsequently been given license categories of their own since then. The salmon fishery continues to be managed through limited entry licensing, and the TAC is determined through target "escapement", or the target number of fish that management would like to see arrive on the spawning grounds. Quotas are not currently in place in this fishery, although some quota "demonstration" fisheries do exist in a small number of areas (Fisheries and Oceans Canada, 2013c; Fisheries and Oceans Canada, 2013d). Therefore, the fishery essentially still remains a competitive one, however each *sector*

(commercial, recreational, and First Nations) is now allocated a share of the harvest, and each gear type within the commercial sector is given an allocation on a coast-wide basis; typically seine receives 42%, gillnet receives 34%, and troll receives 24% (Fisheries and Oceans Canada, 1999). The allocation has changed slightly over the years within the commercial sector between areas and gears (for example, in 2004 the allocation was changed to 40% seine, 38% gillnet, and 22% troll), but on the matter of inter-sectoral allocation, First Nations allocations for FSC purposes are given priority. After these obligations have been met, the commercial sector is allocated 95% of the remaining catch, and 5% is allocated to recreational fisheries.

DFO must manage this fishery 'in reverse' to the way the fishery encounters them as the salmon migrate to their natal streams; the first priority is to ensure a sufficient number of fish on the spawning grounds, second is to provide for Aboriginal fisheries (typically) along the river, and then finally to allocate fish to the commercial sector out in the ocean (Pearse & McRae, 2004). This is no doubt a complicated task.

2.3.1.1 The "Mifflin Plan" and the salmon fishery

The 1980s saw the fishing power continue to climb in Pacific fisheries. Then, to complicate matters, Pacific salmon catches declined precipitously in the mid-1990s, and salmon prices fell due to competition with farmed salmon - an industry that had grown remarkably in those past two decades (ARA Consulting Group Inc., 1996). Based on Sinclair' earlier recommendations for the salmon fishery (Sinclair, 1960), a vessel-buyback program was initiated in 1970 with the Davis Plan, and ended in 1973 with the retirement of 361 vessels (Grafton & Nelson, 2007). Despite the buyback program, fleet capacity was still noticed to be increasing, prompting a Royal

Commission that gave recommendations such as further buybacks, term licenses, and royalties on landings (Pearse, 1982). Opposition by the fishing industry to the recommendations meant that only the buyback (of licenses in this case, not vessels) ever took place, and only 1% of licenses were retired (Grafton & Nelson, 2007). In 1996 when Fisheries Minister Fred Mifflin came into the position, he instituted the Pacific Salmon Revitalization Strategy, the largest of the buyback programs. The "Mifflin Plan" (as it came to be called) implemented $80 million in license buybacks, and finally established the single gear and single area licensing (something which was already in place for herring) in the Pacific salmon fishery. Fishers were previously allowed to fish the entire coast with troll or gillnet gear (seiners had their own class of license which included these gears). The Mifflin Plan divided the coastline into areas (A-H), with gears assigned to each of the areas. Seiners were allowed to choose either the north or south coast (areas A and B), while gillnetters could choose north, central or south coast (areas C, D, and E) and trollers could chose between the north, central or south coast as well (areas F, G, or H).

The effects of the Mifflin plan were that fishers who wanted to use more than one type of gear, or fish more than one area, had to "stack" licenses (buy them from another fisher) on their vessel. The program was directed at cutting fishing power, but its critics claimed it would allow the fishery to be taken over by powerful interests (Gough, 2007), among other things. Ministers who followed Mifflin injected almost another $200 million into the program in license buybacks, and succeeded in reducing the fleet by approximately one half (Dupont & Nelson, 2010). From this program, 48 seine licenses, 444 gillnet licenses, and 305 troll licenses were eventually removed from the Pacific salmon fishery in 1996, and a further 216 seine, 731 gillnet, and 462 troll

licenses in 1998 (Grafton & Nelson, 2007). Overall, 2206 licenses were removed through the Mifflin Plan.

Table 2-1 Chronology of selected relevant events in the Pacific salmon fishery. Source: Dupont and Nelson (2010), (Pearse 1982), Gough (2007), Pearse and McRae (2004), and The Cohen Commission (2010).

1969	The "Sinclair Report" (1960) by economist Sol Sinclair had already identified overcapacity as a growing problem in the salmon fishery; limited entry licensing is introduced
1977	Canada exerts control over its 200 mile EEZ
1982	The Pearse Report "Turning the Tide" (1982) finds that limited entry licensing fails to control capacity in the fishing fleet, recommends fleet reductions and area licensing, as well as royalties and taxes
1990	The Sparrow decision confirms the constitutionally protected right of Aboriginal peoples in the fisheries of BC; has dramatic implications for the access and allocation of all fisheries, especially salmon
1992	Low returns of Fraser River sockeye salmon prompts inquiries and the Fraser Report (1994), the Aboriginal Fisheries Strategy is introduced
1996	The "Pacific Salmon Revitalization Strategy" (aka the Mifflin Plan) is introduced, implements gear and area licensing, and the first round of vessel buybacks begins, 797 vessels (19% of fleet) are retired, the majority of boats surrendered are inefficient older boats with little effective capacity
1998	The second round of buybacks begins under the Canadian Fisheries Restructuring and Adjustment Program after the first round failed to eliminate effective capacity, a further

	1409 vessels are retired by the year 2000
2004	The Pearse-McRae report identifies a great deal of anxiety on the Pacific coast as First Nations treaties has a more significant role in allocation; also identifies reduced harvest opportunities from conservation of threatened stocks as a factor in declining productivity of the salmon fishery
2007	DFO introduces the Pacific Integrated Commercial Fisheries Initiative (PICFI) which is applicable for all fisheries, but has implications for salmon
2009	Low returns of Fraser River sockeye prompts the Cohen commission inquiry, salmon aquaculture, fisheries policy, and climate change are identified as potential factors, among others
2010	Record numbers of Fraser River sockeye return

2.3.2 Pacific herring

The fishery for Pacific herring (*Clupea pallasii*) began in the late 1800s as a food fishery, and diversified into a reduction fishery in the mid-1930s. Around this time, the herring fishery expanded dramatically and continued to do so until 1967 when the fishery collapsed and was closed by DFO (Fisheries and Oceans Canada, 2013b). When the stock had rebuilt and the fishery was re-opened in 1972, roe for export to Japan was the main product of this fishery. While roe is the largest product of this fishery, accounting for almost 90% of herring landings and 86% of herring value in 2011 (British Columbia Ministry of Agriculture, 2012), there are three other license categories: spawn-on-kelp, food and bait, and special use fisheries (i.e. charity sales, and for zoos and aquariums to feed their animals).

Herring spawn-on-kelp is a traditional food for First Nations people in British Columbia, however their substrate may vary from kelp to various branches and eelgrass as well (Fisheries and Oceans Canada, 2013b). The spawn-on-kelp fishery operates in a unique way: seine vessels are used to capture the fish in schools, which are then towed to an enclosed area and allowed to spawn. However, it must be a seine vessel that will designate its (party-based) roe herring license as 'inactive' for the season, and will use the vessel instead to participate in the spawn-on-kelp fishery (with the appropriate license) (Fisheries and Oceans Canada, 2013b).

The roe herring fishery opens at different times during the spring (from February to April) on the British Columbia coast. Roe herring licenses are for either seine or gillnet gear, and the coast-wide TAC is divided up such that the seine fleet (approximately 250 licenses) receives 55% of the allocation, and the gillnet fleet (approximately 1200 licenses) receives 45% of the allocation. Although licenses were initially non-transferable, ways of bypassing this became much easier after 1979 when the owner-operator provision was removed, and leasing of licenses became a prominent feature of this fishery (Sporer, 2001; Gough, 2007). In 1981, to reduce the herring fleet from moving from opening to opening with subsequent inability to limit the catch, DFO moved to area licensing and divided the coast into five geographic areas: Haida Gwaii, Prince Rupert, Central Coast, Straight of Georgia, and West Coast Vancouver Island, with the TAC also being divided up by area, and the equal amount of quota that each license holder received was determined by the number of licenses choosing that area. Fishers were able to harvest more per area by acquiring more licenses with associated quota, as well as to fish in more than one area if they obtained multiple licenses to do so ("stacking" the licenses). In 1997, the seine fleet had exceeded its TAC by 100% in one area, and 70% in another (Sporer, 2001). (Because herring

school, when they are captured with a purse seine net, a vast amount can be pulled up at once, and a single net pull may exceed a fisher's quota in one pull.) This prompted DFO and industry to agree on the current "pooling" system that has been in place since the 1998-fishing season. The pooling structure works like this: each fisher or group of fishers gets together to put all their licenses in a pool, with the implication that only one (or perhaps two) of those fisher's vessels is being used to do the actual catching of the fish (K. Olsen, personal communication, February 14, 2014). This way, individual quotas and overall TAC are less likely to be exceeded because the capacity of the boat will likely be much less than the total amount of quota allowed to be caught with the "pool" of licenses (and associated quotas) on board. In the seine fishery, a minimum of eight licenses must be in a pool, and in the gillnet fishery, there is a minimum of four licenses per pool (Fisheries and Oceans Canada, 2013b). When pooling was introduced, the fishing industry had requested that a maximum of two licenses be stacked on a seine vessel in order to protect employment, keep leasing costs down, and reduce the potential for concentration of fishery access (Sporer, 2001). (It is important to note the distinction between the number of licenses *per pool*, and the number of licenses that may be stacked *per vessel*.) With the exception of some vessels that were granted an exemption to the policy in 1998 (Fisheries and Oceans Canada, 2011), DFO continued to maintain this policy until it was lifted in 2013. The pooling structure also necessitates that harvesters approach brokers or processors to facilitate and finance the pooling of licenses to a vessel if they cannot arrange a pool themselves, meaning that that many license holders will receive the benefit of holding a license without the labor involved in the actual catching of the fish (K. Olsen, personal communication, February 14, 2014). In the pooling arrangement, all license holders must be associated with a pool before their license will

be reinstated for the year. A discussion of the pooling system will be expanded upon in Chapter 4.

Table 2-2 Chronology of selected relevant events in the Pacific herring fishery. Source: Fisheries and Oceans Canada (2013b), Gough (2007), Sporer (2001).

1967	Herring had become the mainstay fishery of the Pacific in the 1960s, catches had risen to over 200,000 t, fishery for Pacific herring collapses and closed by DFO
1971	Small experimental roe fishery begins, Japan is the primary market
1973	Fishery is reopened with a TAC, DFO plans limited entry licensing
1974	Limited entry licensing begins, licenses are non-transferable ('owner-operated') for new entrants to the fishery, roe fishery expands quickly and input controls such as net restrictions and time/area closures are in place, fishers are able to participate in all openings coast-wide, but DFO has difficulty managing the TAC as the fleet generally moves from opening to opening
1977	Canada exerts control over its 200 mile EEZ
1979	Due to sporadic application of non-transferability rules and DFO's difficulty enforcing them, the owner-operator rule is removed[4], roe herring license leasing becomes prominent
1981	DFO divided the roe herring fishery into five geographic locations, each harvester must chose only one area, and must hold multiple licenses to fish multiple areas; gear licensing is also implemented throughout the fleet, harvesters must choose seine or

[4] Anecdotal information suggests that there are various other things that lead to the removal of the owner-operator provision, but cannot be confirmed at this time.

	gillnet gear
1983	Fixed quotas introduced and equal allocations attached to each roe herring license; the spawn-on-kelp fishery becomes limited entry licensed
1985	DFO implements the practice of double-area licensing whereby some areas are required to have two licenses (of the same area) per vessel, the practice increases over time in an attempt to reduce the size of the fleet; herring food and bait fishery is placed under quota-management
1997	Roe herring prices collapse due to weak Japanese economy, landed prices drop considerably, the seine fleet exceeds the TAC in two different areas; double-area licensing is required for all areas except the Central Coast gillnet fishery; the maximum number of licenses that can be placed on a seine vessel is capped at two on the insistence from the UFAWU
1998	"Pooling" structure is introduced to the herring fishery for both gear types, licenses and allocations must be transferred together
2013	The double-area license maximum of two per seine vessel is dropped

Chapter 3: Measuring distribution and concentration of fisheries access

Following the Mifflin Plan, a study was published by Garvey and Giammarino (1996), which examined the issue of concentration by corporate interests in the Pacific salmon fishery. They examined only vertically integrated business structures (fish processors who own the licenses, quota, and vessels) in their assessment of corporate concentration, and did not conduct an investigation of the herring fishery. As well, that study is almost twenty years old now, and the issue is still salient and therefore requires re-examination. As license leasing has become a feature of many Pacific fisheries due to the absence of "owner-operator" policies, this thesis will also aim to more comprehensively address licenses being held by those who do not operate them, but rather hold them for the purpose of leasing them to others (what will be termed "license investors" here). Both vertically integrated fish processors and "license investors" will be grouped together for what will be considered "corporate" interests in this thesis.

3.1 Types of concentration

Concentration can come in a variety of forms. The ones most relevant to the fishing industry will be discussed in this section. Before proceeding however, it is worth examining the definition of "corporate" (or rather the noun "corporation"). While it seems obvious or intuitive to most, it bears repetition here for clarity and to avoid potential confusion. The Cambridge Dictionary defines a corporation as "an organization, esp. a business, that has a legally separate existence from those who run it" (Cambridge University Press, 2014). This highlights the reason that some harvesters incorporate their fishing operations, which is often for tax purposes, insurance, and liability, *inter alia*. It also underscores why the act of incorporation (or lack thereof) alone cannot be used to define what "corporate" means. Garvey and Giammarino used

vertical integration as the defining characteristic of "corporate" for their report, however for the purposes of this thesis, a "corporation" will be defined as an entity with patterns of license and vessel holdings that make it highly unlikely or impossible for that entity to operate those licenses or vessels themselves, which will include fish processors and "license investors".

3.1.1 Direct control

Direct control of fisheries access can be in the form of ownership of the commercial fishing license, and/or the quota associated with the license. In the case of licenses, there are those that are party-based, and those that are vessel-based. Those that are "party-based" or issued to an individual, the owner of a license is therefore the individual on record. In the case of licenses that are "vessel-based", the license is issued to a vessel, and therefore the vessel owner would be considered the license owner. Quotas on the other hand are not a *de jure* property right as determined in the case of *Malcolm v. Canada* (2013), but can constitute a *de facto* property right because (although compensation is not required) quotas are rarely revoked, and therefore ownership of quota is a form of direct control.

3.1.2 Indirect control

Another form of control of fisheries access may come in the form of indirect ownership. These can include contractual arrangements whereby a large processing company finances the purchase of a vessel and/or license for a small operator, with the imposition of contractual obligations to that processor. In the study of corporate concentration in the Pacific salmon fishery, Garvey and Giammarino stated that debt financing was a socially beneficial undertaking because it offered "access to real investments that otherwise would be inaccessible to some, especially to small

operators" (p. 1), and noted mortgage markets as a non-controversial example. It should be highlighted that the Bank of Canada sets interest rates (which mortgage lending rates follow closely) and mortgage markets are monitored by the Government of Canada's Department of Finance, however it is uncertain how license lease fees are being set and who (if at all) monitors them.

3.2 Industry limits on corporate control

Consolidation and concentration draws academic attention for its social and governance implications, and Soliman (2014) notes that concentration in fisheries tends to be viewed as unwelcome from a societal perspective for several reasons: who should be fishing (i.e. those not personally invested versus bona fide fishers) is often a moral judgment; and, monopolistic market structures have the ability to force other market members to accept terms that they would not otherwise voluntarily agree to. It is for this last reason that the Competition Act exists in Canada. Its purpose, inter alia, is "to maintain and encourage competition in Canada in order to promote the efficiency and adaptability of the Canadian economy," and "…to ensure that small and medium-sized enterprises have an equitable opportunity to participate in the Canadian economy." (Government of Canada, 2014b)

In an attempt to curb corporate concentration of fisheries, Atlantic Canada developed owner-operator (as well as fleet separation) policies. Pacific Canada did not adopt such policies, perhaps because the processing companies had been limited to 12% direct ownership of the fishing fleet's boats and/or associated licenses. It was reported that even in 1978, processing

companies still only owned 12% of the overall salmon fleet, but estimated they owned 26% of seine vessels, 15% of gillnet vessels, and only 0.5% of trollers (Shaffer, 1979).

3.3 Methodology: examining concentration and distribution of fisheries access through direct holdings of licenses

This section will only address concentration by examining direct holdings of licenses, because addressing indirect holdings is much more challenging, for reasons elaborated upon in Chapter 4.

Concentration in the salmon and herring fisheries cannot be examined entirely in isolation of other fisheries. An entity that controls many licenses and vessels may have a small number of assets in the salmon and herring fisheries, but also a number of assets in many other fisheries as well. This thesis has identified two categories that could be considered "corporate interests": processors and "license investors". In terms of "license investors", it is important to examine their patterns of license holdings in all fisheries that could categorize an entity as a "license investor", and then examine those entities control of licenses and vessels *within* the salmon and herring fisheries. As mentioned previously, First Nations (or Aboriginal) access to fisheries is an important issue, and so direct holdings of licenses by Aboriginal groups will also be assessed. The methods to identify processors, "license investors", First Nations groups, and those entities not meeting any of those criteria will be discussed next. From this, different categories of license holders will emerge: processors, "license investors", those who are First Nations, and those who are "independent" operators. The aim is to address how the proportion of licenses held by these groups has changed over the time period under investigation.

3.3.1 Identifying processors: vertical integration criteria

Lists of seafood processing licenses were obtained from the British Columbia Ministry of Agriculture for the years 1993-2013, which contained the fields for license number, type, licensee name, facility, and address. Some operations such as fish retail and sport fishing lodges hold licenses to process fish. Single independent fish harvesters may hold one or more of these licenses as well (for example, to kill, clean and package urchin roe on board their vessel). Therefore, it was important to identify large fish processors who held fishing licenses, rather than independent fishers who held processing licenses. The goal was to categorize patterns of processor license holdings to give an indication of *fish processing as the primary business operation*. The license categories used by the Ministry of Agriculture are:

- Commercial salmon canneries producing 1500+ standard cases of salmon per year[5];
- Commercial salmon canneries producing <1500 standard cases of salmon per year;
- Large cold storage facilities (>80 cubic meters);
- Small cold storage facilities (<80 cubic meters);
- Salmon processing;
- Roe herring processing;
- Finfish processing (species other than salmon, herring, or dogfish);
- Invertebrate processing;
- Marine/aquatic plant processing;
- Fish processed from the capture of sport/recreational fisheries;
- Fish processed not for human consumption (i.e. bait).

[5] Email received from the British Columbia Ministry of Agriculture on May 27th, 2014 to confirm that this was 'per year', rather than 'per day/week/month'.

Roe from herring is a very specific product, which was increasingly processed with "roe-popping" machines beginning in the mid-1990s (The Fisherman, various editions). A "roe-popping" machine costs approximately $35,000 CAD (Triman Technologies, personal communication, May 27, 2014). Due to the specificity of the product, and the capital investment required, a roe processing license was considered to be indicative of processing as a primary business operation. The other licenses (finfish, salmon, and invertebrate) are, however, unspecific. These species could be turned into a wide variety of products, such as fresh dressed head-on fish (requiring minimal processing) to frozen fillets (requiring extensive processing). The end products and the capital investments required by the use of these other processing licenses cannot be ascertained, however they were considered indicative of processing when held in conjunction with a large cold storage facility. Entities were categorized as being a "processor" if their license holdings met one of the following criteria in a particular year:

- Commercial salmon cannery (of any size);
- One or more large cold storage facilities in conjunction with one or more roe herring processing licenses;
- One or more large cold storage facilities in conjunction with one or more of the following: salmon, finfish or invertebrate processing.

Entities who met one of these criteria were selected from the database as "processors" and were then cross-referenced with the fisheries licenses lists obtained from DFO for the years 1989-2013 for all Pacific fisheries to determine how many, if at all, were holders of fishing licenses as well.

3.3.2 Identifying "license investors":

License lists were obtained from DFO for the years 1989-2013, with the fields displaying license type, number, and category, as well as the species, gear type, area, Vessel Registration Number, vessel name, vessel owner (for vessel-based licenses), and Over-All Length (OAL).

It is important here to identify patterns of license and vessel ownership that make it highly unlikely or impossible for the owner of the assets to operate them all. These patterns include how many and what kind of licenses are "stacked" and how many vessels are owned.

3.3.2.1 Multiple area licensing and license "stacking" characteristics

License stacking happens mainly for the following reasons: 1) it is permitted by DFO to stack licenses of the same category on a single vessel, regardless of area (i.e. five urchin licenses per vessel); 2) area licensing necessitates (if permitted) that harvesters stack different area licenses of the same category on their vessel if they want to fish in multiple areas (i.e. three licenses for three different areas of salmon troll); and 3) licenses of different categories may be stacked on to a vessel (i.e. a halibut vessel may have a sablefish license stacked onto it). DFO's Integrated Fisheries Management Plans were scanned for keywords on stacking in order to ascertain which fisheries this practice is allowed in, and this information was integrated into the criteria for determining "licenses investors" holding patterns.

In terms of gear and area licensing, most of British Columbia's fisheries (including herring) remained essentially unchanged over the period under investigation, however the salmon fishery changed dramatically. Because the Mifflin Plan divided up the salmon fishery into gears and

areas for licenses, licenses had to be categorized differently in order to apply the criteria of "license investor" consistently across our time series. Before the Mifflin Plan, one salmon license of category A entitled its bearer to fish the entire coastline with gillnet and troll gear (seiners required their own category of license). Post-Mifflin, for an operator to fish equivalent areas, she/he would have required six licenses (North, Central and South coast gillnet; and North, Central and South coast troll). The provision of "stacking" multiple licenses was brought in to the Mifflin Plan so that operators could continue to fish as widely as they had previously, but had to buy other gear/area licenses from others if they wished to do so, and in this way brought about rationalization of the fleet. Many operators purchased and subsequently re-designated the area or gear of licenses after the Mifflin Plan to accommodate this provision (J. McIssac, personal communication, June 30, 2014), and so the potentially high amount of this activity complicated, rather than simplified the analysis. Therefore, gillnet and troll licenses in the post-Mifflin time period were categorized the same way as they had been in the pre-Mifflin time period, as a category A license.

It should be noted that entities holding multiple salmon licenses in the same area *and* gear would have been identified as "license investors" because while license stacking is allowed (and encouraged by DFO) on vessels, it is intended for licenses of *different* areas and *different* gears (in salmon). An entity holding multiple area licenses in the same area and gear (in regards to salmon) would therefore indicate a situation of an entity owning multiple vessels with the same area/gear licensing and potentially leasing the license to another, as they would be unable to fish multiple vessels in the same area at the same time. For example, if an entity is listed as holding three area C salmon gillnet licenses, it is unlikely that an independent operator is fishing all three

boats at the same time. Rather, this likely indicates one owner of the vessels and associated licenses, and leasing of the other two licenses, or possibly all three. Categorizing salmon gillnet and troll licenses separately will be considered in an uncertainty analysis later in this chapter.

In fisheries in which stacking is not permitted (i.e. only one license per vessel, as in groundfish trawl, shrimp trawl, crab, halibut and sablefish), entities holding multiples of non-stackable licenses were also identified as "license investors", because this would require the entity to hold those licenses on multiple vessels, again with the indication that they cannot be on more than one boat at the same time, and therefore are likely deriving income from a license they are not operating themselves. A list of license categories, area licenses, and same-vessel stacking allowances is available in Appendix A.

Licenses for some fisheries were excluded from the analysis because of the specialization of the fishery, or the manner of harvest (i.e. hand harvested molluscs were not included, as they do not require a capital investment of vessels or gear). As well, some licenses categories were in place at different times during the investigation period (i.e. the octopus by dive fishery only had licenses from 1992-1999, likely as an experimental fishery). A full list of licenses and their inclusion in the analysis can be found in Appendix B.

As noted earlier, for fisheries licenses that are party-based the holder will be identified as an individual, however for vessel-based licenses the "eligible holder" of the license is a vessel. Therefore, the vessel owner in this case was assumed to be synonymous with license owner. The license lists obtained from DFO for vessel-based licenses was provided with the vessel owner. It

is recognized that vessels may have up to 64 shares, with various shares of ownership amongst parties (Cruickshank, 1991). However for simplification and ease of analysis, it was assumed that the contact name on record for the vessel is the primary shareholder, and therefore the primary vessel (and hence license) owner.

3.3.2.2 Multiple vessels criteria

The provision of stacking licenses in Pacific fisheries means that a variety of licenses may be combined on a number of vessels; work by Ecotrust Canada (2013) summarizes the variety of stacking practices that has evolved as fishers attempt to diversify their operations for financial stability. Because of this variety, it is difficult (and potentially erroneous) to determine which licenses always "go together", and so for ease of analysis, an assumption was made regarding how many vessels an entity could reasonably operate instead. Fishers may switch from using one vessel outfitted with certain fishing gear in one season, to another vessel outfitted with different gear in a different season. However, it was assumed that there is a point at which holding multiple vessels (with their associated licenses) moves from being a fisher's diversified operations into a fleet instead. It was therefore assumed that an entity who held licenses on more than two vessels would be unable to fish them all personally, and would therefore require someone else to operate the vessel (and its license).

The list below outlines the overall licenses holding characteristics that were used to identify entities as "license investors" for selection from the database, based on the description of characteristics outlined above.

1. Holding of >3 salmon category A licenses (while only one license was needed before 1996, many operators anticipated the Mifflin plan and sought to acquire enough licenses before 1996 in order to stack them later[6]);
2. Holding of >2 salmon seine license (under the same assumption that seiners also anticipated area licensing);
3. Holding of >2 herring seine licenses (two was the maximum that could be stacked per seine vessel from the 1998-2012 time period, but double licensing was occurring earlier than this);
4. Holding of >4 herring gillnet licenses (as a minimum of four licenses is required per pool)[7];
5. Holding of >3 geoduck licenses up to 2011, and 5 geoduck licenses from 2012 onward (as up to three may be stacked per vessel, and the policy was modified to five in 2011);
6. Holding of >3 rockfish licenses, as up to three may be held per vessel;
7. Holding of >5 red *or* green sea urchin licenses (as up to five may be stacked on a vessel);
8. Holding of >5 sea cucumber licenses (as up to five may be stacked per vessel);
9. Holding of >1 shrimp trawl, groundfish trawl, prawn and shrimp by trap, halibut, sablefish or crab, (only one license per vessel is permitted in these fisheries; no provisions to stack more than one license of these same categories);
10. Holding any combination of licenses on >2 vessels[8].

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[6] Industry collaborators have indicated that many operators anticipated *area* licensing and so often acquired enough licenses (usually three) to stack them later, but gear licensing was not as widely anticipated. This is reflected in the patterns of license holdings in the data.

[7] Industry sources have noted that it is unlikely that an independent harvester could afford more licenses than this. As per the Lorenz curves displayed later in the chapter with the herring gillnet fishery, almost 80% of cumulative license holders hold only one or two licenses.

Entities that met any of the criteria mentioned above were categorized as "license investors" and selected from the database.

3.3.3 Identifying Aboriginal organizations

In light of the Supreme Court's Sparrow decision, the Aboriginal Fisheries Strategy was created in 1992, and allocations in the Pacific fisheries changed a great deal. Licenses being held by First Nations groups require different consideration in the analysis because a mandate of the DFO is to recognize their constitutionally protected rights to fisheries access (Government of Canada, 2014a).

The Northern Native Fishing Corporation (NNFC) was established in 1982 with assistance from the Canadian government; it is a not-for-profit, Aboriginal-owned corporation designed to increase the participation of First Nations in fisheries. NNFC holds primarily only salmon gillnet licenses for use by its members. The board of directors of the Native Brotherhood of British Columbia also holds licenses, as do many other First Nations groups.

The DFO license lists were scanned for Aboriginal groups using keywords such as "band", "band council", "tribal council", "village council", "First Nation", "Nation", "society", "territorial/territory", or "association", and then this list was reviewed to ensure it's accuracy.

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[8] Consultations with industry collaborators on the project have indicated that the most vessels an individual could reasonably operate themselves is two (for different fisheries in different times of the year). More than three vessels begins to border on a 'fishing fleet', as well as indicating the presence of "stick boats", a vessel that is not seaworthy but only there to 'hold' a license or quota in principle, while it is actually leased to someone else on a sea-going vessel.

As well, the DFO license lists were scanned again to ensure that Aboriginal groups had not been excluded because they had been listed by different nomenclature. Licenses held by groups identified as "Aboriginal" were then selected by the database.

With the Aboriginal Fisheries Strategy came several Aboriginal agreements also aimed to increase First Nations participation in fisheries, such as:

- The Allocation Transfer Program (ATP) (1994). Licenses are issued by the Minister of Fisheries and Oceans to a First Nations group as "Communal" under the Allocation Transfer Program. They are relinquished by other harvesters through a buyback program, and then issued to First Nations groups;
- The Aboriginal Aquatic Resource and Oceans Management Agreements (AAROM) (2005);
- The Pacific Integrated Commercial Fisheries Initiative (PICFI) (2007). This was also a buyback program of voluntary relinquishment.

This list is not exhaustive, but covers some of the major programs in place. Licenses relinquished to programs such as PICFI, ATP, and AAROM, but not yet in use by First Nations groups are kept in a DFO inventory. They are listed with the license category "Q", which were not included in the analysis because, although other fishers have relinquished them, they are assumed to not be currently in use by Aboriginal groups, and hence still in the inventory.

3.3.4 Identifying "independent" operators

License holders who were not categorized as processors, "license investors" or Aboriginal organizations were defaulted to "independent" holders of licenses.

It bears relevance at this stage to emphasize several points:

1. These criteria are binary in nature: an entity is categorized as "processor" or not, "license investor" or not, "Aboriginal" or not, or "independent" or not. An entity that holds just enough licenses of certain types or numbers of vessels will be categorized as "corporations" (processors and "license investors"). The criteria makes no effort to characterize or categorize the *size* of operations, only that entities that meet this criteria are no longer likely to be "independent" operators; their patterns of license holdings almost certainly dictate that they are not operating the licenses themselves (with the assumption that they are leased to another).
2. Groups that are categorized as First Nations represent only those groups that were identified from the list using the nomenclature described. It should be highlighted that they are certainly Aboriginal *individuals* who hold commercial fishing licenses as well, however the ability to ascertain who those individuals are from the license lists is not possible. Implications of this are discussed at the end of this chapter.

3.3.5 Cross-referencing corporate records and holdings

The Statistics Canada Inter-Corporate Ownership (ICO) records were cross-referenced to determine the controlling owners of the license holders in the license lists. Only larger entities

could be searched using the ICO because it only contains corporations whose combined assets exceed $200 million, or whose combined revenue exceeds $80 million. The ICO was originally printed in paper volumes, and then became available in electronic format in 2001. Bound paper volumes were only published every two years for the earlier years under investigation (1992, 1994, 1996, 1998, and 2000), and so the assumption was made that if a company controlled a subsidiary in consecutive volumes, that the ownership did not change hands during that time (for example, if company "A" controlled company "B" in 1994 and 1996, that it did not change hands and then back again during the course of 1995). The ICO electronic volumes were only available for this project from 2004 onwards, and so similar assumptions regarding companies and control of their subsidiaries had to be made from 2000 (the end of paper volumes) to 2004 (start of electronic volumes). The ICO was available for every year from 2004 to 2013. Because the ICO only tracks corporations of a certain size, the corporate records cross-referencing was supplemented by the Government of British Columbia's Corporate Registry Services searches conducted through the "BC Online" site (Government of British Columbia, 2014), which allowed the tracking of dissolutions and amalgamations of smaller companies. On one occasion, searches required the use of the Bloomberg Terminal located at the University of British Columbia's Sauder School of Business[9]. Subsidiaries and controlling companies were then categorized as 'child' and 'parent' companies respectively, so that assets (licenses) owned by the child company would appropriately show as being controlled by the parent company.

[9] See the University of British Columbia Library (http://resources.library.ubc.ca/821) for further information on accessing this resource.

Once compilation, categorization, and cross-referencing of the data were completed, it was analyzed using a relational database (©Microsoft Access 2010) for changes in the percentages of license holdings in the salmon and herring fisheries over the time period under investigation. It is important to examine the proportions, as opposed to absolute changes in numbers of holdings because extensive fleet rationalization occurred during the time period under analysis, and absolute values of holdings would produce misleading results, however they have been included in many cases to demonstrate reduction in the size of the fleets.

A schematic of the database is included in Appendix C to provide a visual aid to its structure and workings.

3.3.6 Concentration Ratios, the Herfindahl-Hirschman Index, and Lorenz curves

Industrial concentration is often measured using various indices. Concentration ratios measure the market share of the top *n* firms in the industry. It also places a weight of one on the share of each of the largest *n* firms, and a value of zero on the others (Sawyer, 1985). Nonetheless, the concentration ratio is still a useful indicator, and has been used by many authors in the studies of fisheries (e.g. Gauvin et al., 1994; Adelaja, Menzo, & McCay, 1998; Connor, 2001). The concentration ratio (CR*n*) is calculated by summing the shares of the largest *n* firms (Sawyer, 1985). For example, the CR_4 is a common measure of concentration, measuring the top four firms share of the industry. The equation for the concentration ratio is shown below, where m_i indicates the market share held by each entity *i*, and *n* defines the i^{th} firm being counted.

$$CR_n = \sum_{i=1}^{n} m_i$$

The Herfindahl-Hirschman index (HHI) of industrial concentration is the sum of squares of all the proportional shares in the industry (Coulter, 1989), and can be expressed between zero and one, but also between zero and 10,000 (as will be done later). By using squares, it gives a weighting equal to the share that each firm holds (Sawyer, 1985). The equation for the HHI is shown below, where N is the number of firms in the industry, and m_i indicates the market share of i firm.

$$HHI = \sum_{i=1}^{N} (m_i)^2$$

The Lorenz curve displays the relationship between the cumulative percentage of income recipients in ascending order on the horizontal axis and the cumulative percentage of income they receive on the vertical axis (Coulter, 1989). In this way, a diagonal line from the lower left to top right corners of the plot would indicate perfect equality, in that 10% of the recipients receive 10% of the income, 50% of the recipients would receive 50% of the income, and so on. A curve from any observed data set would likely bow below the line of perfect equality, and the greater it does so, the greater the degree of inequality (Coulter, 1989). While Lorenz curves were originally used to measure income distribution, they have been used to measure distribution in fisheries as well (e.g. Pálsson and Helgason, 1995).

Concentration ratios and the HHI were calculated for the following fisheries as a measure of concentration, and the Lorenz curves were plotted as an alternate measure of distribution for comparison.

3.4 Results of direct holdings

The results of the analysis reveal that there has been a gradual increase in the amount of licenses in the salmon and herring fisheries that are controlled by processor and "license investor" groups. How this control is exerted however varies greatly between species and gear types, as the following sections will show.

For the following fisheries in species and gear types, results will be presented as percent changes, as well as showing the numbers of "corporations" (that is, both processors and "license investors"), along with trends in license accumulation.

3.4.1 Salmon

The results of the salmon fishery demonstrate that the proportion and trend in concentration varies greatly from gillnet and troll gear to purse seine gear. The salmon fishery's fleet underwent significant reduction as a result of the Mifflin Plan, and so while holdings are reported in percentages, absolute numbers of licenses are included in the graphics to demonstrate this rationalization.

3.4.1.1 Salmon seine

The salmon seine fishery had its own class of license before the Mifflin Plan took effect, and so the category of license essentially remained unchanged over the time period. In terms of Aboriginal participation in this fishery, holdings were a mere 2% in 1993, but increased to 10% of this fishery in 2012. License holdings by independent operators fell from 58% to 35% over the period, while total corporate holdings (processors and "license investors") rose from 40% to

55% from 1993 to 2012. The vertically integrated processors in this fishery decreased the *absolute* numbers of licenses they held by 2012 (Figure 3.1), however their percentage of licenses has increased notably over the past twenty years, from 25% to 39%.

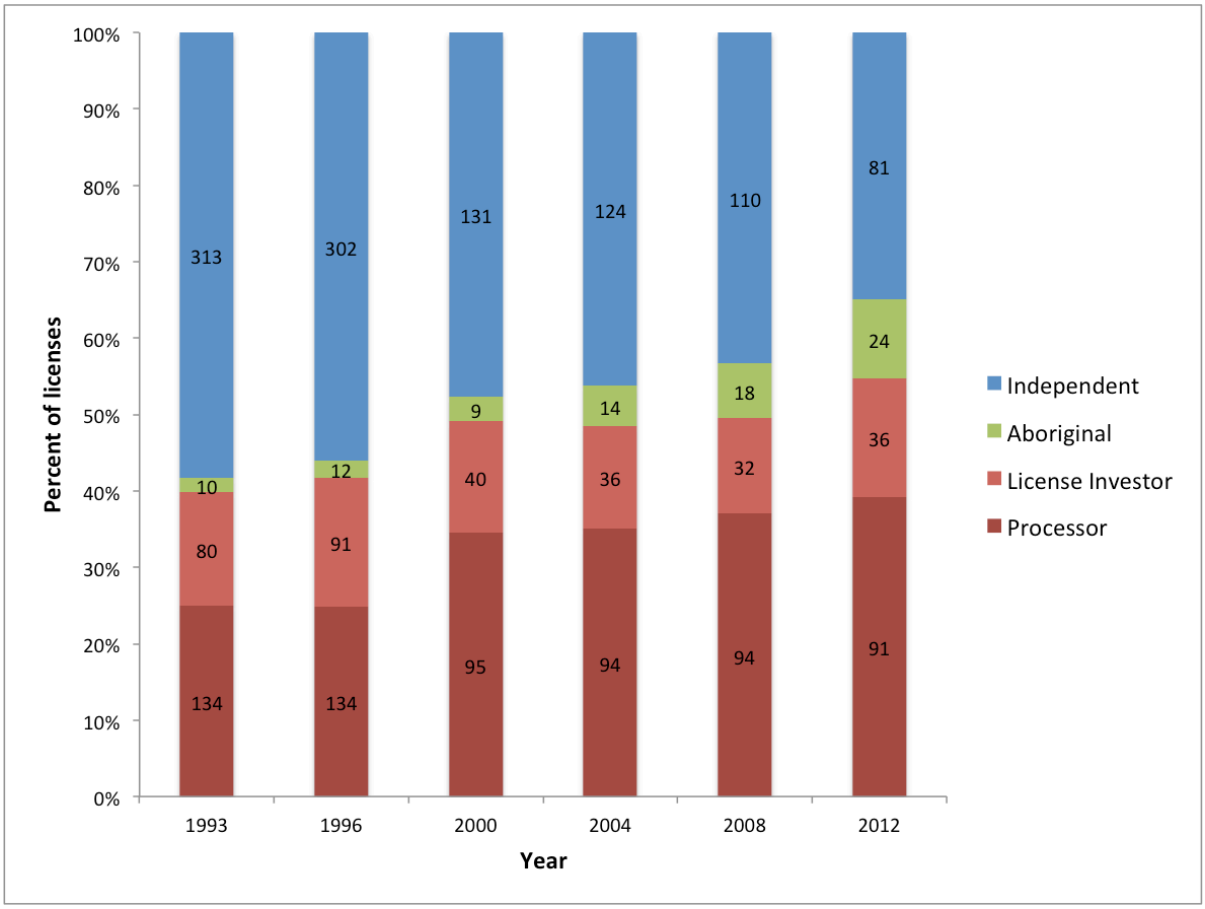

Figure 3.1 Percent of licenses held by independent, Aboriginal, "license investor" and processor groups in the salmon seine fishery over the time period under investigation. Absolute numbers of licenses are shown.

While examining the percent of licenses held is relevant, it is also interesting to look at the number of processors and "license investors", and their patterns of license accumulation. In the case of the salmon seine fishery, the number of processors and "license investors" has declined (Figure 3.2), however the average number of licenses held by each has increased over the period.

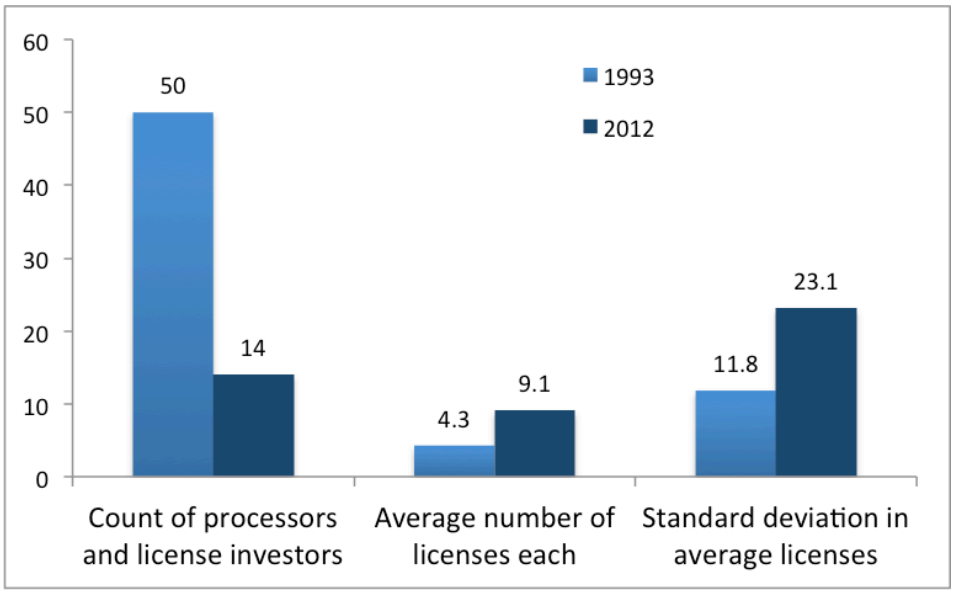

Figure 3.2 Counts of processors and "license investors", average number of licenses each, and standard deviation in average licenses each in the salmon seine fishery over the time period under investigation.

For calculation of the four-firm Concentration Ratio (CR_4) and HHI, if one license is considered one market share, then the CR_4 in the salmon seine fishery was 24% in 1993, and 46% in 2012 but the more comprehensive measure, the Herfindahl-Hirschman Index, moved from 280 points in 1993, to 1530 in 2012. As the CR_4 and HHI increase, so does the amount of concentration of the market shares. Lastly, the Lorenz curve for the salmon seine fishery in 1993 and 2012 is shown, which demonstrates the distribution of licenses amongst holders irrespective of the criteria used to categorize groups in this thesis (Figure 3.3), as another measure of distribution for comparison. The deeper the Lorenz curves 'bows' below the line of perfect equality, the greater the degree of inequality.

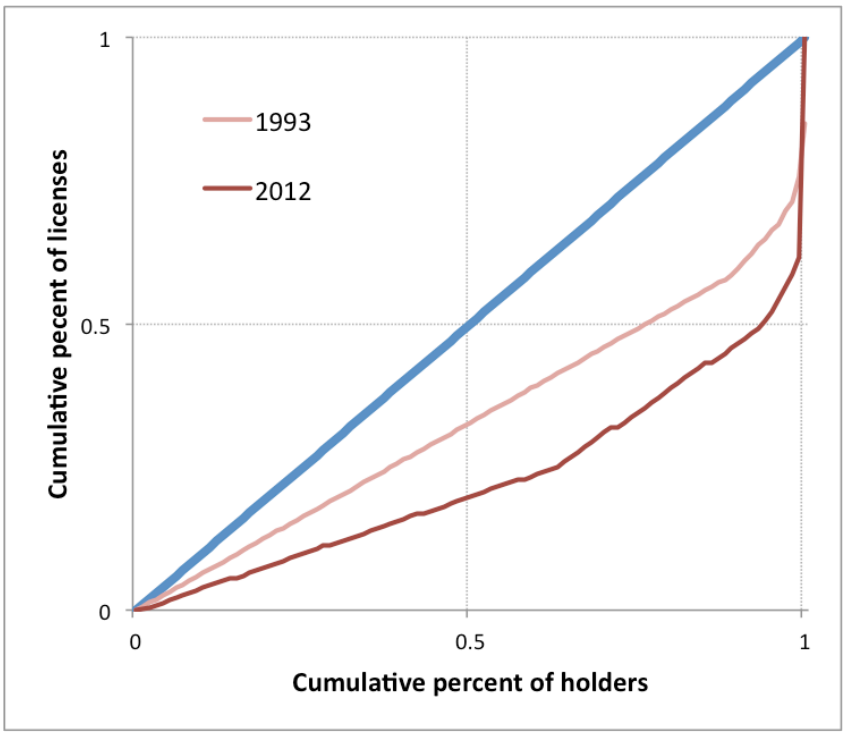

Figure 3.3 The Lorenz curves for the salmon seine fishery in 1993 and 2012.

3.4.1.2 Salmon gillnet and troll

As mentioned previously, a category A license before the Mifflin Plan allowed its bearer to fish with gillnet and troll gear. As such, all gillnet and troll licenses were categorized the same way (as category A) for the post-Mifflin time period as well to simplify analysis.

Aboriginal groups increased their holdings from 7% to 25%, and these major strides are largely due to the holdings in salmon gillnet licenses by the Northern Native Fishing Corporation. License holdings by processors and "license investors" decreased from 13% to 8%, and independent holdings also declined from 80% to 67% over the time period. The license holdings

by processors in the salmon gillnet and troll fishery is too small to be displayed separately, and therefore they are grouped together here.

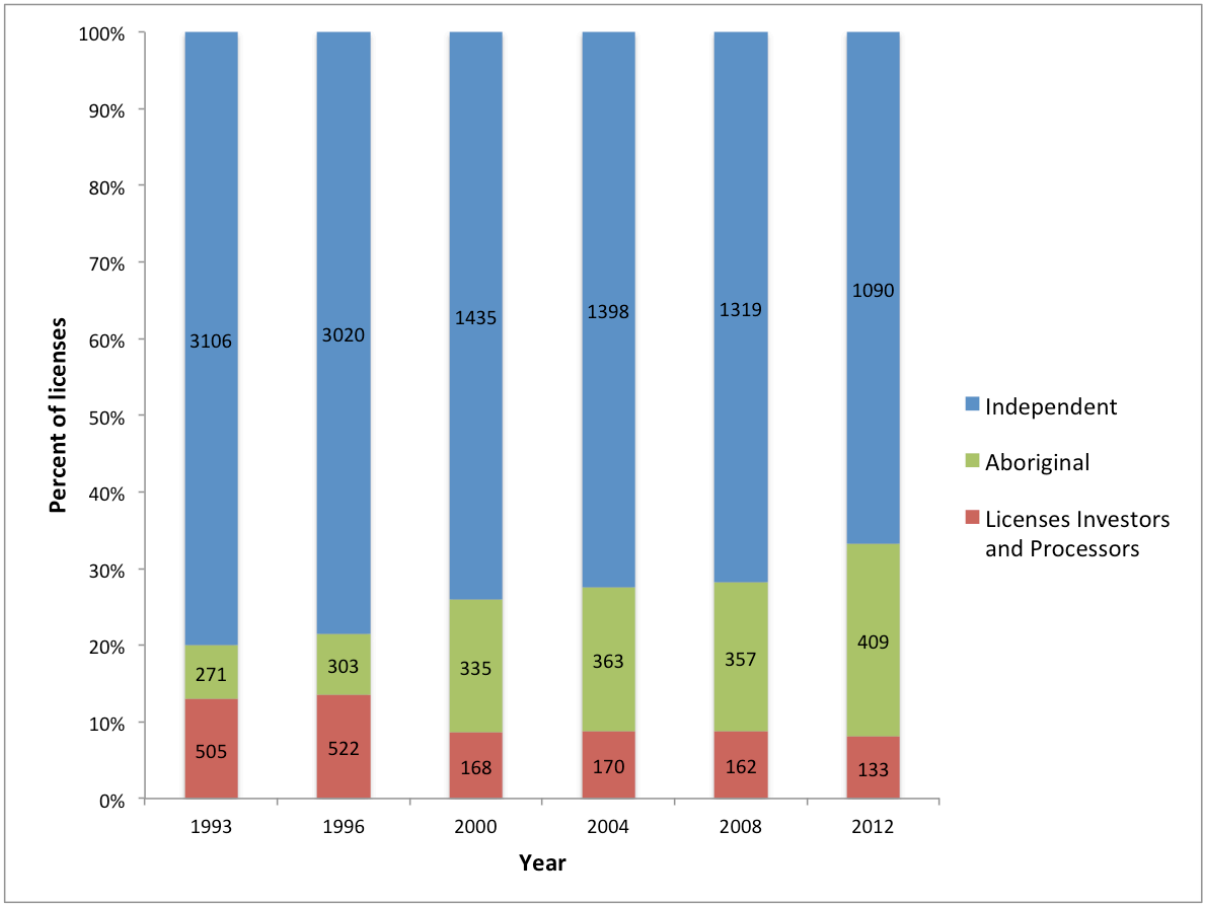

Figure 3.4 Percent of licenses held by independent, Aboriginal, "license investor" and processor groups in the salmon gillnet and troll fishery over the time period under investigation. Absolute numbers of licenses are shown.

In terms of the number of processors and "license investors" in the salmon gillnet and troll fisheries and their patterns of license accumulation, the number of these groups in the gillnet and troll fisheries has declined (Figure 3.5), however the average numbers of licenses held per entities has remained the same.

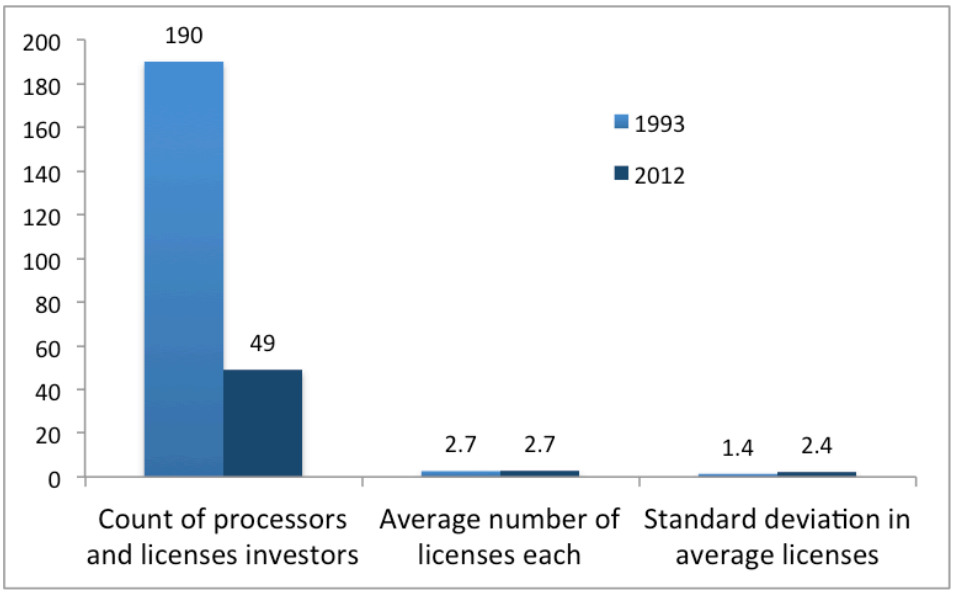

Figure 3.5 Counts of processors and "license investors", average number of licenses each, and standard deviation in average licenses in the salmon gillnet and troll fisheries over the time period under investigation.

The CR_4 and HHI are not calculated for these fisheries, as the largest holder of licenses here is the Northern Native Fishing Corporation – an organization whose holdings are not considered "corporate". The Lorenz curves for the salmon gillnet and troll fisheries are displayed below (Figure 3.6) to represent distribution of licenses in these fisheries, irrespective of the criteria developed in this analysis to identify different user groups.

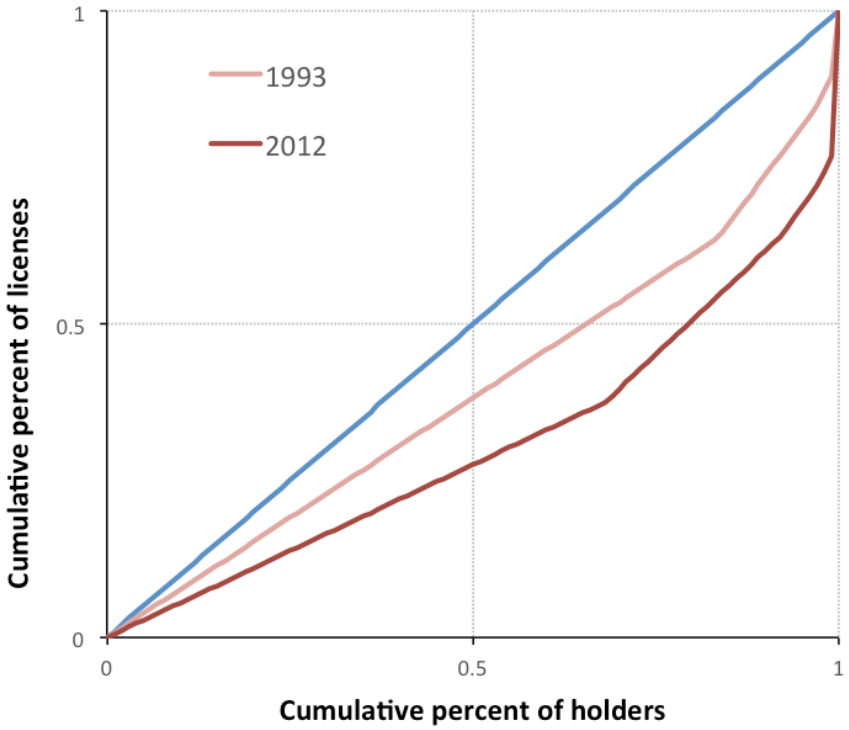

Figure 3.6 The Lorenz curves for the salmon gillnet and troll fisheries in 1993 and 2012.

3.4.2 Herring

The herring fishery demonstrates potentially stronger trends in concentration in the roe-by-gillnet fishery, but how this is distributed between fish processors and "license investors" varies from how it is distributed in roe-by-seine. The herring spawn-on-kelp fishery exhibits a considerable deviation in trends of concentration.

3.4.2.1 Roe herring by seine

In the roe herring by seine fishery, Aboriginal participation has increased only very marginally. Aboriginal groups held one license in this fishery in 1993, representing only 0.4% of all licenses,

and this increased to six licenses in 2012, or 2%. Processors held 28% of all licenses in 1993, and this increased to 32% in 2012 (Figure 3.7). "License investors" held 11% of these licenses in 1993, and 19% in 2012. Independent groups held 60% of licenses in 1993, and this decreased to 46% in 2012.

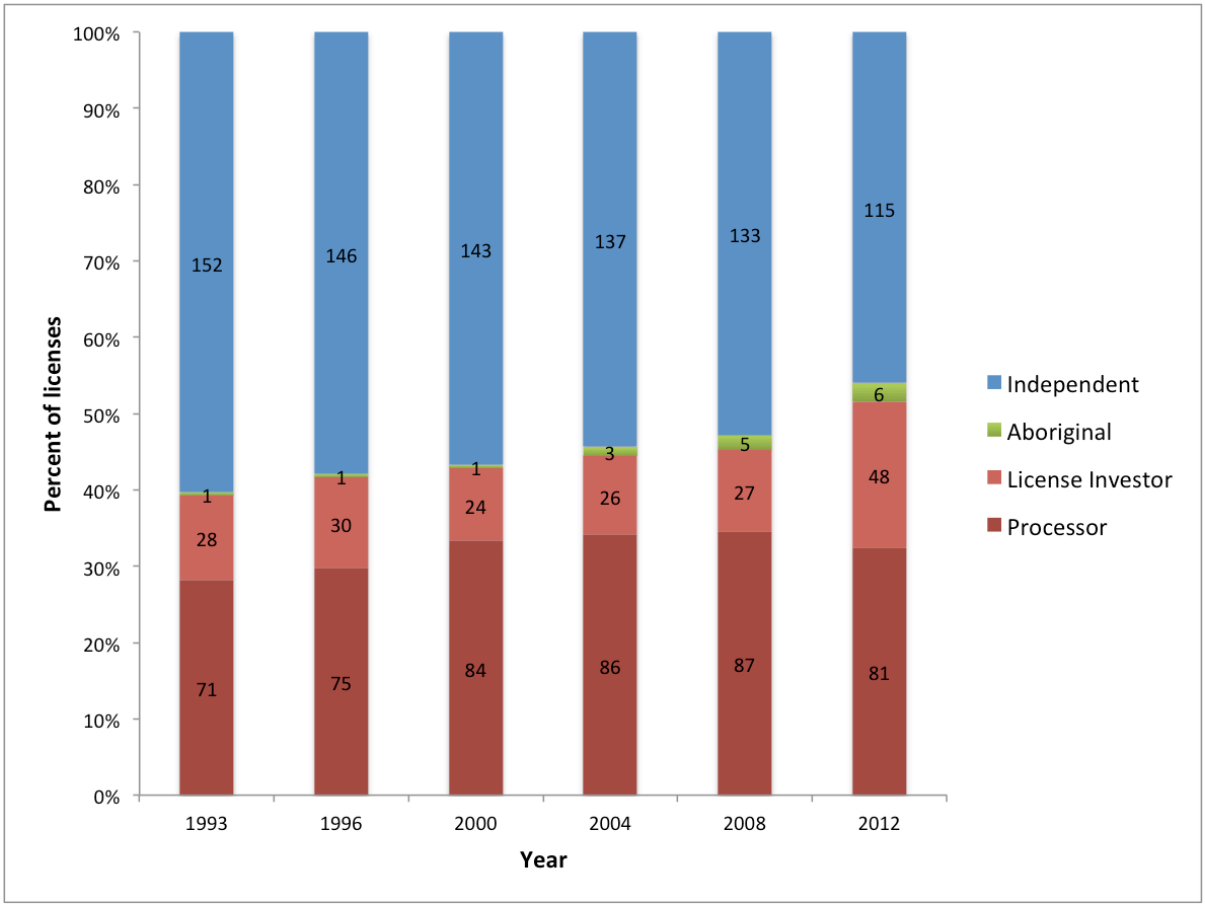

Figure 3.7 Percent of licenses held by independent, Aboriginal, "license investor" and processor groups in the roe herring by seine fishery over the time period under investigation. Absolute numbers of licenses are shown.

When looking at patterns of license accumulation in the roe herring by seine fishery, the numbers of processors and "license investors" has increased in this case (Figure 3.8), as has the average number of licenses each.

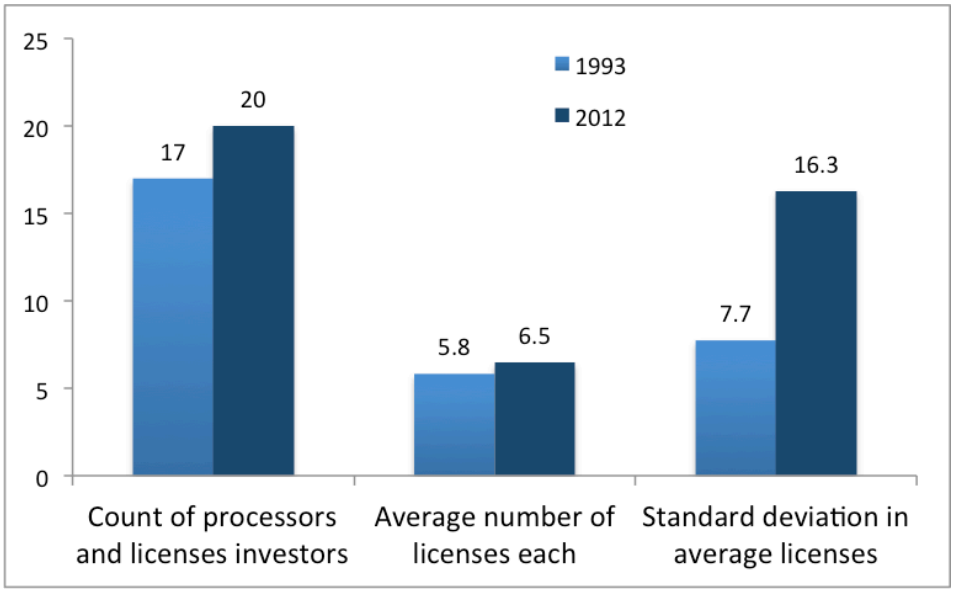

Figure 3.8 Counts of processors and "license investors", average number of licenses each, and standard deviation in average licenses in the roe herring by seine fishery over the time period under investigation.

The CR_4 in this fishery was 27% in 1993, and 38% in 2012, and the Herfindahl-Hirschman Index in the roe herring by seine fishery in 1993 was 270 points, and in 2012 was 960. The Lorenz curves for the roe herring by seine fishery are shown below. The Lorenz curves measure distribution of licenses in the fishery and to reiterate, the deeper the 'bow' of the curve, the greater is the degree of inequality. Because the quotas for each license in roe herring are allocated as equal shares, then the quota attached to one license could still be considered one market share, however only licenses are considered here as 'market shares' here as quotas were not evaluated.

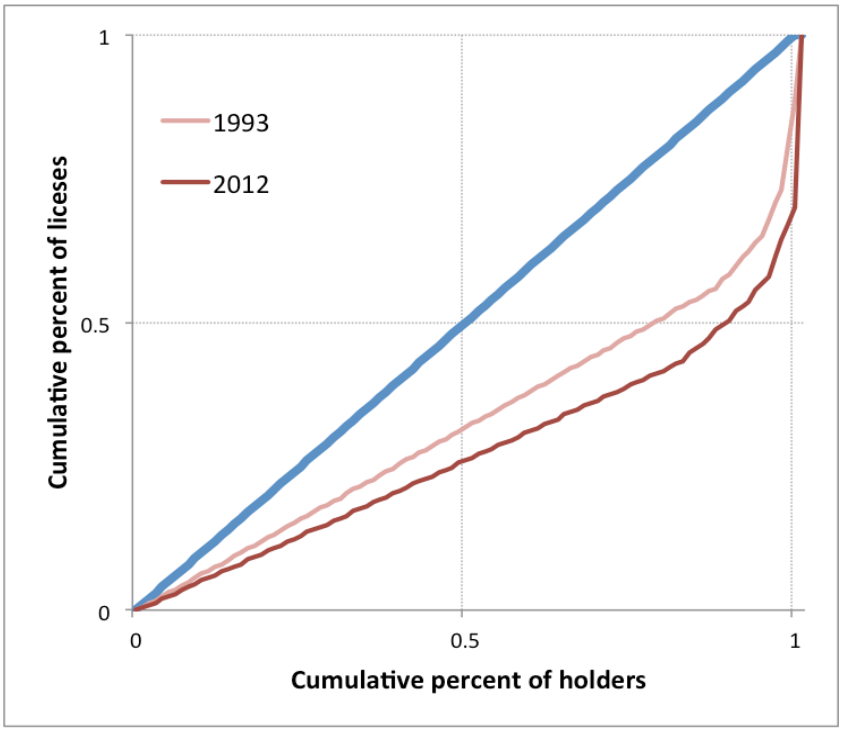

Figure 3.9 The Lorenz curves for the roe herring by seine fishery in 1993 and 2012.

3.4.2.2 Roe herring by gillnet

The roe herring gillnet fishery closely mirrors the seine fishery in regards to Aboriginal participation. This analysis found that there was no Aboriginal groups holding licenses in the roe herring by gillnet fishery in 1993, and this increased only slightly, to 9% of all licenses in 2012. The independent harvester group held 78% of all licenses in 1993, and only 51% in 2012. License holdings by processors increased from 10% of licenses in 1993 to 15% in 2012. "License investors" doubled their holdings, from 12% to 25% in 1993 to 2012 respectively (Figure 3.10).

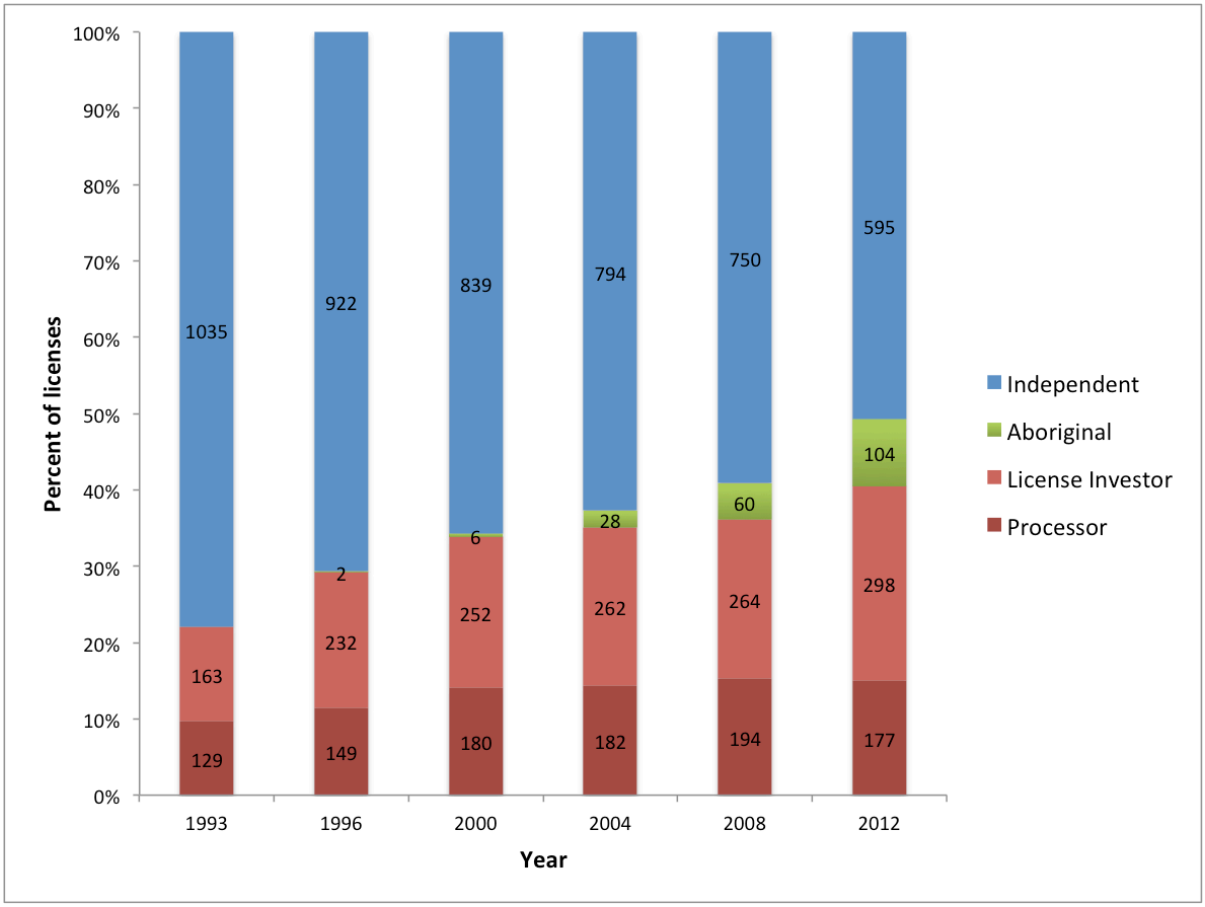

Figure 3.10 Percent of licenses held by independent, Aboriginal, "license investor" and processor groups in the roe herring by gillnet fishery over the time period under investigation. Absolute numbers of licenses are shown.

When examining patterns of license acquisition, the numbers of processors and "license investors" has declined (Figure 3.11), and the average number of licenses each is increasing.

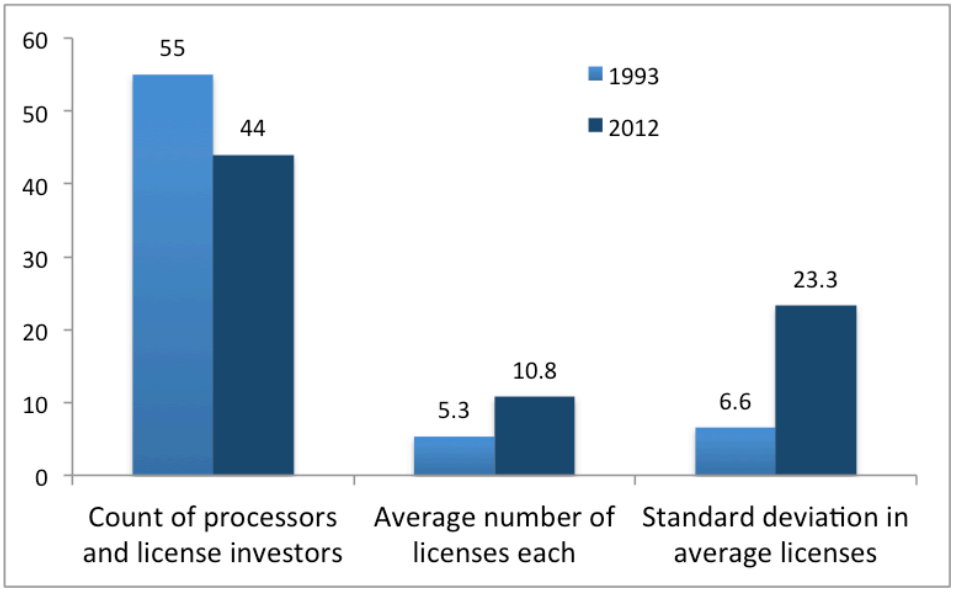

Figure 3.11 Counts of processors and "license investors", average number of licenses each, and standard deviation in average licenses in the roe herring by gillnet fishery over the time period under investigation.

The CR_4 in this fishery was 7% in 1993 and 20% in 2012, and the Herfindahl-Hirschman Index in the roe herring by gillnet fishery increased from 30 points in 1993, to 220 in 2012. To reiterate, the greater the CR4 and HHI, the greater is the amount of concentration present in the fishery. The Lorenz curves for the roe herring by gillnet fishery are displayed below as a comparative measure of distribution.

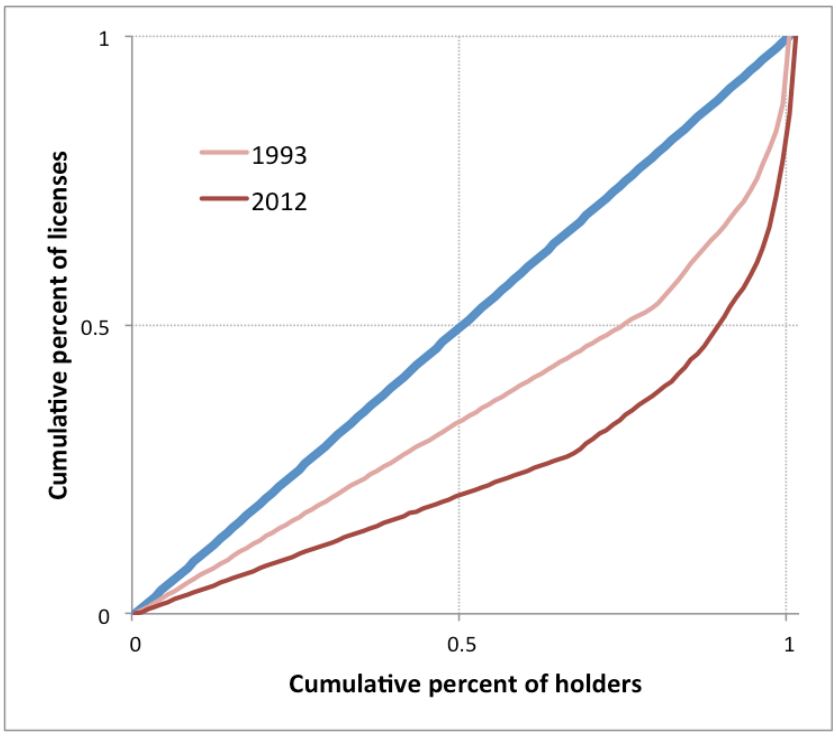

Figure 3.12 The Lorenz curves for the roe herring by gillnet fishery in 1993 and 2012.

3.4.2.3 Herring spawn-on-kelp

As mentioned at the start of section 3.4, the distribution of holdings of licenses in the salmon and herring fisheries amongst different groups varies markedly based on the fishery, and nothing demonstrates this more poignantly than the spawn-on-kelp fishery (Figure 3.13). In 1993, independent groups held 62% of the licenses, and Aboriginal groups held the remaining 38%, and in 2012 this changed to 59% and 41% respectively. As far as the data reveals, there are no holdings of licenses by processor or "license investor" in this fishery.

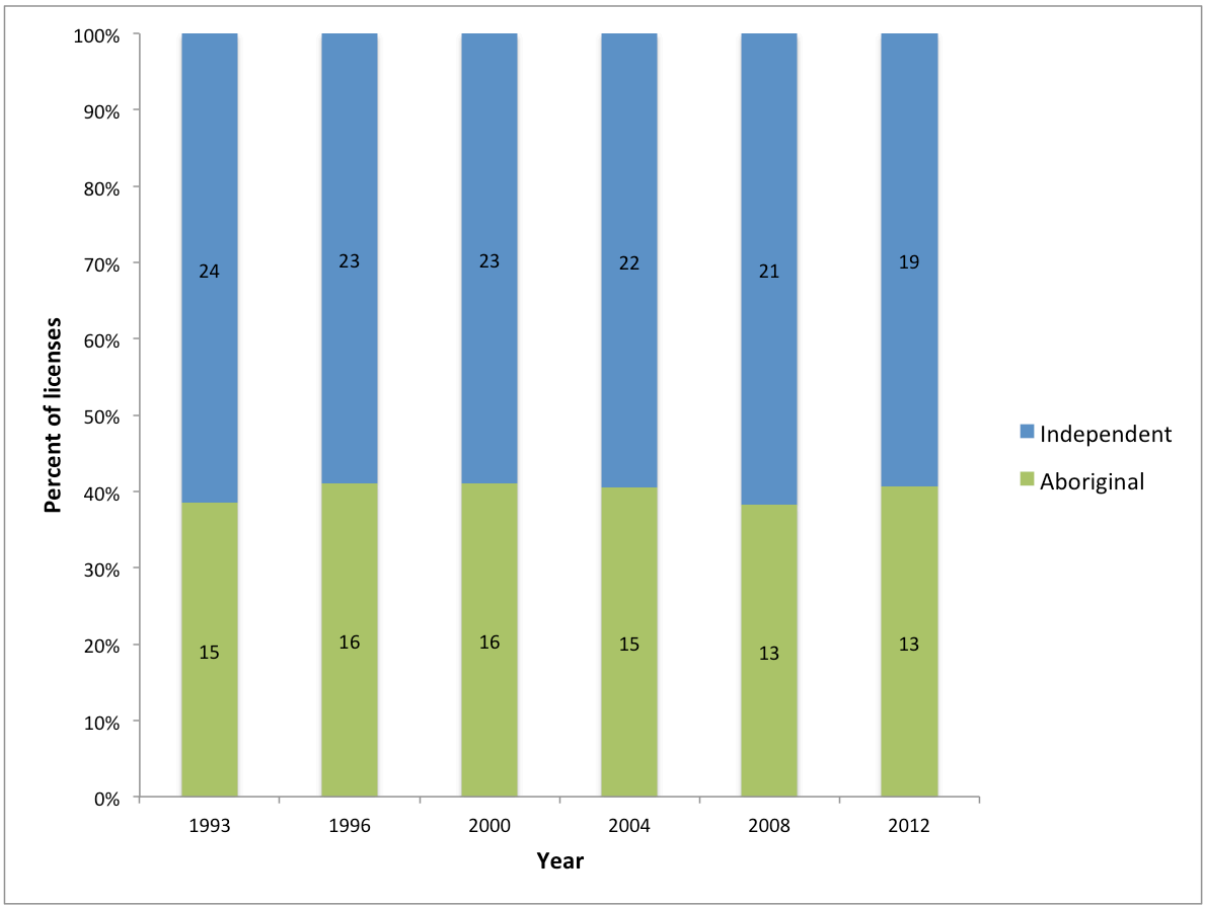

Figure 3.13 Percent of licenses held by independent and Aboriginal groups in the herring spawn-on-kelp fishery over the time period under investigation. Absolute numbers of licenses are shown.

3.4.3 Uncertainty analysis results

Although consultations with members of the industry came to a general consensus on the criteria used in the analysis for "license investors", exceptions-to-the-rule frequently arose. In light of this, the analysis was re-run several times, making small adjustments to parts of the criteria each time to examine how the results differed. For example, the numbers of vessels that one could operate before being categorized as "license investor" was adjusted from two to three, and the

analysis was re-run. The results from differing criteria analysis are not markedly different from the original criteria's results presented above, but are included in Appendix D for reference.

3.5 Discussion

3.5.1 Trends in the fisheries

The results of the analysis have shown that the proportion of licenses that are held by processors and "license investors" has had a general trend of increase over the past twenty years in the salmon and herring fisheries, with various differences between species and gear types. There are some deviations from the trend, as in the spawn-on-kelp fishery, where the analysis found no control by processors and "license investors" at all. Some points on the number of entities (processors and "license investors") and the average number of licenses held by each (as in Figures 3.2, 3.5, 3.8, and 3.11) should be highlighted:

- When the two move in the same direction, it is likely indicating an increase or decrease in participation in the fishery (i.e. more groups with more licenses, or less groups with less licenses);
- When the two move in opposite directions, where the *count* of groups increase and *averages* decrease, this is indicating fewer licenses in more hands ('dilution');
- When the two move in opposite directions, where the *count* of groups decrease and *averages* increase, this is indicating more licenses in fewer hands ('concentration').

What should draw attention is the general decline in number of entities in the processor and "license investor" group, but the increase in average numbers of licenses per entity. This

'concentration' result is most acutely seen in the salmon seine, and roe herring by gillnet fisheries. Additionally, the roe herring by gillnet fishery demonstrated an interesting trend: the proportional increase demonstrated by the "license investors" was much more noticeable in this fishery when compared with, for example, salmon gillnet (and troll). In the roe herring by gillnet fishery, "license investors" more than doubled their holdings. Whether or not this is an artifact created by data limitations (see Chapter 4), or more reflective of actual trends in the fishery is uncertain, however anecdotal information suggests it may be the later. Further research would be required to confirm this, which is elaborated upon in Chapter 4.

(Shepherd, 1985) described four types of market structure relevant to concentration:

- Pure monopoly – those that hold close to, or 100% of the market share;
- Dominant firms – those that hold 50% to 90% of market shares;
- Tight oligopolies – those that have a four-firm concentration ratio (CR4) above 60%, and;
- Effective competition.

While none of the CR_4 in the results fall within these ranges, it is important to note that in the salmon seine fishery, the CR_4 increased almost twenty percent in as many years, and is currently close to the "dominant firm" category. Should the trend continue unabated, a monopoly has the potential to form in this fishery.

3.5.2 Structure-Conduct-Performance models

The subject of concentration in industries received a great deal of attention from the economist Joe S. Bain in the late 1940s and early 1950s. Bain theorized that an industry's structure

determined its conduct, which in turn impacted its market performance (Lipczynski & Wilson, 2001; Martin, 2002), and Bain developed this into the Structure-Conduct-Performance (SCP) model. A firm or an industry's structure, conduct and performance can be measured in a variety of ways, but concentration is of the measures frequently used to determine structure, conduct can be determined through pricing, advertising, or investment, and performance through a variety of industry or firm goals such as profits, efficiency, or growth for example. The SCP model is highly debated because of the causality assumed in the relationship between structure and performance (Lipczynski & Wilson, 2001), and therefore an analysis using the SPC model was not conducted (and also because which "performance" aspect to measure was uncertain). However, some other trends in the fisheries are still relevant to discuss not only for interest's sake, but also for a more holistic discussion of the state of the fisheries in question. As this thesis has already demonstrated, concentration of fisheries access (the licenses) has been increasing over the past twenty years, and the number of licenses has decreased (commensurate with management goals of reducing fleet sizes). In terms of catches, both the roe herring and salmon fisheries have experienced a general trend of decreased landings since 1989 (Figure 3.14). Ex-vessel and wholesale prices (when adjusted for inflation to 2012 constant dollars using the Bank of Canada's Consumer Price Index calculator) have remained relatively stable and on par with one another over the same time period (Figure 3.15).

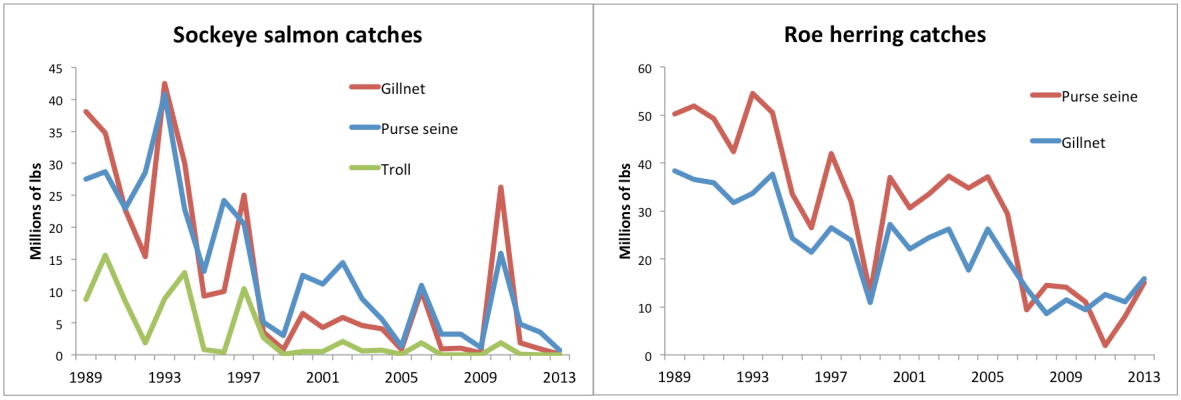

Figure 3.14 Catches for sockeye salmon and roe herring from 1989-2013. Data supplied by DFO on request.

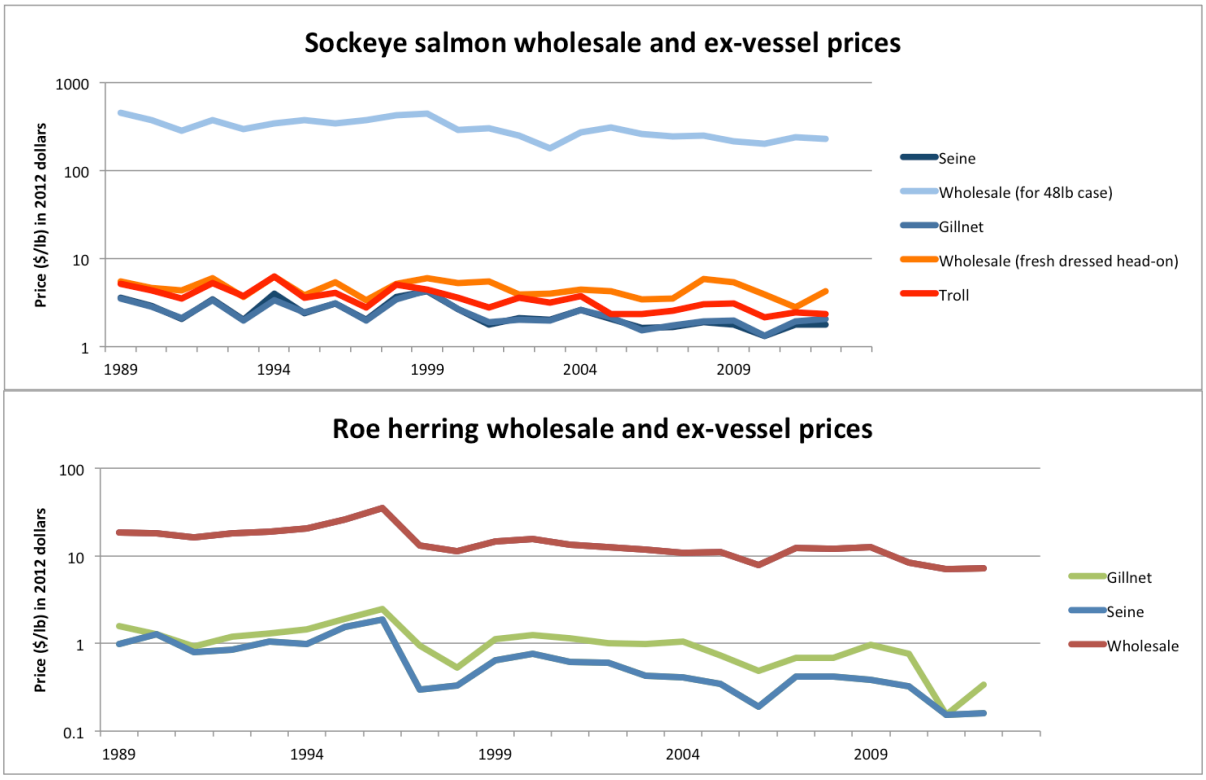

Figure 3.15 Wholesale and (aggregate) ex-vessel prices for sockeye salmon and roe herring from 1989-2013 in constant 2012 dollars. Data supplied by DFO and BC Ministry of Agriculture on request.

Without drawing any conclusions regarding causality, it can be seen that concentration in these fisheries has increased and the number of licenses has decreased, catches have decreased, and prices have remained relatively stable. Harvesters are facing relatively similar prices, but reduced harvest opportunities. As ex-vessel prices have remained somewhat stable in light of reduced harvests, whether or not harvesters face a "price-cost squeeze" from the "cost" side will be discussed in Chapter 4.

3.5.3 Size of operations

Attention was drawn at the end of section 3.3.5 to the binary nature of the criteria and how meeting one of the corporate criterion would group an entity one way or another, regardless of its size; in other words, no attempt was made to distinguish the size of the business of the processors or "license investors". The binary nature of the criteria is reflected in the standard deviation of the average licenses held per entity in each group (Figures 3.2, 3.5, 3.8, and 3.11), and can be used as a proxy for the variability in the size of operations. Fisheries that have exhibited higher degrees of involvement by processors and "license investors" appear to have more variability in the size of those operations in recent years. This is noted in the salmon seine, roe herring by seine, and roe herring by gillnet fisheries. In the salmon gillnet and troll fisheries, where processor and "license investor" involvement was noted to be reduced (in comparison to the other fisheries), there was also little variability in the size of these operations.

The increasing amount of standard deviation in the average number of licenses held by processor and "license investor" groups demonstrates that there is a great deal of variation in the size of operations. Some operations are merely individuals that have accumulated enough licenses to a

point that categorizes them as “license investors”. Other operations are indeed extremely large business entities that operate marine entertainment parks, car dealerships, and advertising spaces, in addition to fishing operations. In the case of the roe herring by seine fishery, the increasing average number of licenses held by each entity (processor or “license investor”) may indicate the increasing trend towards holding licenses for leasing. This can be conjectured because the number of *processors* who held licenses in the roe herring by seine fishery in 1993 was five, and in 2012 it was three, therefore the increase in the count of entities seen in Figure 3.8 is due to an increase of “license investors”. *However* the increase in average license per entity (processors and “license investors” combined) is more likely due to the holdings of one fish processor, who held 27% of the processor-held roe herring by seine licenses in 1993, and 93% of them in 2012.

In salmon seine (where the count of processors and “license investors” decreased), seven processors held licenses in this fishery in 1993, and only two held licenses in 2012. This indicates that the decline in count of entities is coming both from processors and “license investors”, however the holdings of one fish processor (the same mentioned previously) is most likely responsible for the increase in average licenses, as they moved from 60% of processor-held licenses in 1993, to 98% of them in 2012.

Turning attention to the roe herring by gillnet fishery (where again the count of processors and “license investors” declined), ten processors held licenses in this fishery in 1993, and only three did in 2012; the decline in count of entities is coming slightly more from processors (decrease of seven) than “license investors” (decrease of four). Again however, the increase in averages may be largely coming from the same fish processor, who held only 26% of all processor-held

licenses in 1993, and 88% of them in 2012. Processors aside, the increasing proportion of licenses being held by "license investors" might suggest the emergence of a new type of "corporate" concentration; not that exerted by processing companies as was thought by Garvey and Giammarino (1996), but rather by entities (individuals, or businesses) that acquire and accumulate licenses for the explicit purpose of leasing them as an income stream. However, license leasing is both an implicit and explicit feature of this fishery (more on this in Chapter 4).

3.5.4 Aboriginal holdings

While it was not specifically displayed in the results, there was also large standard deviation in the average license holdings per Aboriginal group or band council. The large amount of standard deviation in the Aboriginal group highlights that there is a great deal of variation in the number of licenses that each band council holds, but the fact that this variation showed a decreasing trend from 1993 to 2012 is an indicator that more Aboriginal groups are reaching the same level of attainment of license holdings. Whether or not this is an encouraging sign is dependent upon the amount of license holdings that these groups aspire to. In the report on First Nations place in the Pacific fisheries by Jones, Shepert, and Sterritt (2004), the panel recommended that First Nations be allocated 50 per cent of all *fish*, above and beyond the allocations for Food, Social and Cermonial purposes. As this thesis has not been able to consider the licenses in use by Aboriginal *individuals* that were relinquished under the PICFI program (or other such similar programs previously discussed), it cannot be ascertained if this goal is being reached. The Aboriginal participation in these fisheries is likely to be slightly higher because any First Nations individuals holding commercial licenses could not be differentiated in the license lists.

3.5.5 Comparison to previous findings

The results from this research have arrived at similar conclusions to that of Shaffer (1979) in regard to the relative exertion of corporate control of the salmon fishery in the earlier years under analysis, but seen that concentration has continued to increase beyond that in the past twenty years. This study has also expanded on the study by Garvey and Giammarino (1996) by looking into the herring fishery as well. However, Garvey and Giammarino found that approximately 60% of the salmon seine fishery was under corporate control (and the authors had been explicit regarding vertical integration) in 1996, whereas this study found vertical integration in the salmon seine fishery to be approximately 25% in 1996, a result that agrees more closely with the ARA Consulting Group Inc., (1996) findings of approximately 1/3rd of the salmon seine licenses and vessels under processor control in 1996. Furthermore, this study has developed a more comprehensive definition of "corporation" which includes "license investors", and in doing so created a more complete assessment of "corporate concentration" that lies outside the standard definition applied to fish processors and vertical integration.

3.5.6 Industry limits on concentration

Shaffer (1979) had noted that the processing industry was limited to 12% control over the salmon fishery in the late 1970s. However, there is evidence that the fish processing industry's cap of 12% ownership of salmon licenses (at least in the seine fishery), has been exceeded at least since 1993, when processor ownership of this fishery was over 20%, and in 2012 was almost 40%. Garvey and Giammarino (1996) found no cause for alarm regarding corporate concentration in the salmon fishery in their report based on Shaffer's mention of a 12% cap, however this study has conducted a much more thorough investigation of distribution and

concentration, both in the salmon and herring fisheries, and found that concentration is increasing, and distribution of fisheries access is shifting into fewer hands. Sumaila (2010) has emphasized that when fisheries undergo rationalization as part of management actions to alleviate pressure on the resource, some degree of concentration is to be expected, and therefore normal. Whether or not managers anticipated the degree of concentration noted in these current findings is uncertain, as recent management objectives regarding caps on concentration in these fisheries have not been uncovered. The implications of the findings of this analysis are discussed next in Chapter 4.

Chapter 4: Conclusion

4.1 Increasing concentration in the context of sustainability

Distribution of access and concentration of fisheries benefits are an indicator that are becoming encompassed in broader definitions of fisheries sustainability, such as that outlined in the Fisheries and Aquaculture Department of the Food and Agriculture Organization's Technical Guidelines for Responsible Fisheries (UN FAO, 2003). Commonly accepted objectives of fisheries sustainability have often focused on ecological aspects, as global fisheries have increasingly become overexploited (Pauly et al., 2002). It is recognized that fisheries must be ecologically sustainable as well, and fleet reductions may be required to reduce pressure on the resource to ensure that there are some fisheries benefits to distribute at all (Sumaila et al., 2012). However, *how* the benefits are distributed amongst remaining participants of the fishery should be carefully managed to meet broader goals, which include social equity, amongst others (Béné, Hersoug, & Allison, 2010). If an increasing amount of license leasing becomes a feature of these fisheries, new challenges may be encountered. For example, a recent study argues that there are dangerous consequences for the safety of fishers engaging in leasing practices, as they assume more risk at sea for greater revenue, versus those fishers who owned their assets (Emery, Hartmaan, Green, Gardner, & Tisdell, 2014).

4.2 Owner-operator policies

Owner-operator policies are perhaps, temporally sensitive ones. Implementing them at the same point in time as limited entry licensing would seem to be the most feasible way of avoiding some potentially perplexing problems. Implementing owner-operator policies much later in the management timeline than limited entry licensing can create several challenges:

- The imposition of owner-operator policies will decrease the value of the licenses because their transferability is now reduced; the only buyers and sellers of the licenses are other fishers with relatively similar access to capital (with some exceptions). This could be thought of as moving from an open market for licenses (whereby anybody with sufficient capital can purchase the license) to a closed market.
- The decreased license values means that many owners who do not operate their licenses will rush to sell them while they may still receive a higher price for them, causing a flood of licenses on the market. Basic theories of supply and demand means that the excess supply will further decrease the price of the licenses.
- For harvesters who have held their licenses for many years in the anticipation of using the sale of the license as a "nest egg" for their retirement from the fishery, the drop in price may be unwelcome news for their plans to exit the fishery, prompting them to oppose the policy.
- For harvesters who wish to gain entry to the fishery, the reduced fixed costs in the form of license purchase may be welcome news; a highly polarized group of fishers may result from these opposing views.

The results of this research have shown that an increasing number of licenses in these fisheries are under "corporate" control (which as has been emphasized, includes processors and "license investors"; the most likely group to oppose owner-operator policies). As this number appears to be on the rise, the implementation of owner-operator policies may be increasingly difficult. The report "A commission of inquiry into licensing and related policies of the Department of Fisheries and Oceans: the fisherman's report" (Cruickshank, 1991) outlined challenges faced by

fishers who were (and seemingly continue to be) leasing licenses from those not operating them, and gave recommendations for amelioration of those problems. Fishers had argued that if they were going to be leasing a license (and paying a form of rent on access to the resource), they should be paying this rent to the government, rather than to other individuals or to fish processors. The report also made recommendations on implementation of owner-operator policies, in that they should be phased in over a period of ten years, potentially to avoid the excess supply of licenses on the market. Furthermore, it would be interesting to see if the legal case of *Saulnier v. Royal Bank of Canada* (2008) has implications for the security of the property rights of fisheries access, and how this will affect fisher's access to capital through traditional lending institutions.

As mentioned in Chapter 3, ex-vessel and market prices have remained relatively on par with one another, but harvest opportunities have been decreasing with DFO's more conservative approach to fisheries management. Whether or not fishers face a "price-cost squeeze" (specifically on the 'cost' side) is uncertain. This may be in part because any lease fees paid for licenses are unknown (more on this in section 4.5.1.1) and although some attempts are made to estimate them for a few fisheries (for example, see Nelson Bros. Fisheries Ltd., 2013), DFO does not directly track lease fees. Furthermore, the "Cost and Earnings Survey" that DFO previously conducted has not been repeated in recent years (for example, the last report published in 2004 was for the Atlantic region).

4.3 How much is too much?

This thesis has focused on concentration within a particular industry, and it started by addressing why we should examine concentration. We should now take a step back and ask ourselves "Are there cases where concentration has been a good thing?" In the Global Financial Crisis of 2008, some speculated that it was the structure of the Canadian banking sector which helped the nation pull through the crisis relatively unscathed compared with its neighbor to the south (Arjani & Paulin, 2013). The Canadian banking sector could be considered highly concentrated, with only five or six major financial institutions making regulation of the industry much easier.

The discussion does require some attention to the issue of "How much concentration is too much?" A survey of many texts on industrial organization in an attempt to tackle this question revealed something interesting: the discussion of "how much is too much" is rarely (if at all) addressed. Measures such as the CR_n and HHI can tell us *how* concentrated an industry is, but do not tell us if or when this becomes a problem. Threshold levels of when concentration is "good" or "bad" are absent, and with ample reason. Threshold levels are likely to be different in every industry, and in many different circumstances. In the case of the Canadian banking industry, a large degree of concentration may have been extremely helpful in preventing a more painful financial crisis; in the case of the fishery, even a small amount of "corporate" concentration (leading to license leasing) could have the potential to be detrimental to the financial viability of fisher's individual operations. This thesis makes no attempt to ascertain "How much concentration is too much in the fishing industry?" but has instead attempted to demonstrate the path that distribution and concentration of access can take in the absence of provisions to prevent it. It is uncertain if the current degree of concentration has been anticipated or not, as objectives

pertaining to this are absent from DFO's Integrated Fisheries Management Plans. In the United States, the Department of Justice's Antitrust Division considers industries with a HHI between 1500 and 2500 points to be moderately concentrated (United States Department of Justice, 2014) and tracks mergers that increase the HHI by 200 points in concentrated markets. Canada's Competition Bureau does not police levels of concentration within industry (Crépeau & Duhamel, 2009).

4.4 Limitations and strengths of research

As mentioned at the end of Chapter 3 (section 3.5.1), the data received from DFO came with noteworthy limitations. For *party-based licenses* (rockfish, roe herring, spawn-on-kelp, Schedule II), there was no vessel designated to them in the license lists. As such, the "multiple vessel" criteria outlined in categorizing "license investors" does not fully capture this aspect. Because the license owner is always listed as an individual or business, the name attached to the licenses does not change if the license is leased for the season. If vessels had been included in the party-based licenses, it is likely that more entities would have been categorized as "licenses investors", because while repeat vessels from other licenses would not have changed the results, new vessels appearing with these party-based licenses would have. In this way, party-based licenses likely underestimate the amount of license leasing activity, and therefore the amount of "license investors". The uncertainty analysis using ">3 vessels" attempts to address how more vessels might have changed the results.

In the case of the *vessel-based licenses*, because the license is attached to a vessel, this creates another challenge. If the lessee leases the vessel *and* license from the lessor, then the lessor still

shows up as the license owner, because he/she also owns the vessel (and the vessel owner was considered synonymous with license owner). However, if the lessee *only leases the license* from the lessor, then license is then transferred to the lessee's vessel, and the lessee shows up at the license owner, because he/she is the vessel owner. The only way that the lessor is recognized as the true license owner is through a confidential contract outlining these terms, and so the actual owners of the vessel-based licenses may be unknown. So, in this way, vessel-based licenses are also likely to underestimate the amount of "license investors" if *only the license* (and not the vessel as well) is leased for the season. Anecdotal information suggests that large fish processors are seeking to divest themselves of vessels, while retaining ownership of the licenses. To reiterate: *party-based licenses* create difficulties tracking how a license is *leased*, whereas *vessel-based licenses* create difficulties tracking how a license is *owned*.

The pooling system in the roe herring fishery also created several challenges for this research. The current pooling system in place virtually necessitates that holders of licenses are either lessors or lessees of licenses. Many holders (approximately 70%) held only one license in roe herring by gillnet and even more (the next 12% of cumulative holders) held only two licenses (and four is the minimum required in a 'pool'). Industry collaborators indicate that currently, one license is essentially useless in prosecuting this fishery because the costs would far exceed the revenue gained (from the amount of fish able to be caught with the quota attached to one license), and therefore many fishers currently have to lease upwards of ten licenses to ensure that their revenue would exceed their costs. In light of this, and with a criteria which aimed to address patterns of license holdings that indicate when fishing assets are not being operated by their owner, the situation in the herring gillnet and seine fisheries is much more opaque. The

ability to access DFO license lists with "pool captains" (the lead fisher in the pool and most likely lessor of the licenses) would help to ameliorate this problem, but it is possible that confidentiality restrictions might be met with this data request.

The ability to comprehensively search the ICO records was hampered by not having access to the 2001-2003 records. These years were unavailable for download through the UBC Library's "Abacus" (British Columbia Research Libraries' Data Services[10]) website, and purchase of the volumes from Statistics Canada ($375 CAD per fiscal quarter) would have exceeded reasonable research budgets. Many fishing entities may not have been listed in the ICO due to the size of their operations, making it difficult to track their subsidiary operations. While I have attempted to counteract this by using provincial corporate registry searches, and the search of these records was thorough, it was not exhaustive. As well, numbered companies were not searched with the provincial corporate registry to determine the directors or presidents on record, and potentially find further "parent-child" subsidiary relationships; the record searches again would have exceeded reasonable research budgets and timeframes.

Lastly, attempts were made to reach out to officials at DFO in order to solicit feedback on the research, but were unsuccessful[11]. This feedback would have been an extremely beneficial part of this thesis, as the collaboration of the Canadian Fisheries Research Network is between

[10] See http://abacus.library.ubc.ca for information on accessing this resource.
[11] Calls placed to the DFO Pacific Region office on May 2 & 3, 2014; messages were not returned. Emails placed to ex-DFO official/reputable industry consultant on March 13, 2014 and May 7, 2014; emails were not responded to. Email placed to DFO official on May 22, 2014; email was not responded to.

industry, academia, and government, to produce meaningful research. While industry played a substantial role in the collaboration, government officials were not as readily available.

4.5 Future research

Two areas of fruitful future research are apparent after the completion of this thesis, that of assessing indirect corporate concentration of fisheries access, and that of monopsony or oligopsony influence on ex-vessel price.

4.5.1 Indirect control

This thesis outlined in Chapter 3 that indirect control of fishing licenses was another form of "corporate control" of fisheries access. Here, it's outlined more explicitly the form this control can take, and I address why I was unable to evaluate it and how it may be addressed with future research.

4.5.1.1 Leasing

Access to capital is arguably one of the most important factors in ownership of licenses, especially given their rising values. In terms of the herring fishery since the pooling arrangement came into place, harvesters are required to gather a certain number of licenses (minimum of four for gillnet and eight for seine) into a pool before their licenses (and associated quota) will be reinstated for the start of the fishing season. If harvesters do not own this minimum number of licenses, they must lease them from another harvester; since the lease fee tends to be set pre-fishing season (K. Olsen, personal communication, February 14, 2014), the flat fee will be deducted from whatever the fishers earns for the catch, regardless of in-season fluctuations or variability in the landed catch. Although leasing does happen fisher-to-fisher, it also is often

facilitated through a fish processor. In this situation, a fisher (for whatever reason) may be required to approach a processor who will act as an intermediary; the processor will lease the licenses from an "armchair" harvester, and then re-lease them out to the active harvester; Cruickshank (1991) noted that processors generally provided this as a service, which helped them to secure production. More recently, processors may be adding an intermediary lease fee in between (K. Olsen, personal communication, February 14, 2014), making the final fee deducted from the 'active' harvester's catch even higher (although this practice cannot be confirmed without conducting confidential interviews). An article dated September 28, 1998 in "The Fisherman" detailed one harvester's struggle with a large fish processor after the processor "misrepresented" (changed in-season) the price of the lease fee. Rather than being paid by the processor for his catch, the harvester was given a bill for his new lease fees and asked to sign a contract accepting his indebtedness to the processor (The Fisherman, 1998). According to the article, twenty-six other fisheries filed similar suits in court that year. Conditional sales agreements are another means by which processors can indirectly control fishing licenses. Through this channel, a fisher will purchase a license and vessel from a processor over a fixed payment schedule (Cruickshank, 1991). Whether or not the fisher is obligated to return their catch to that processor during the payment period is uncertain, although likely.

4.5.1.2 Contractual obligations

Another way that fish processors exert indirect control over the fishing licenses they do not control is by a contractual arrangement whereby the harvester must deliver their catches to a certain processor (Cruickshank, 1991). In some cases, if a processor leases a license from one fishery to a harvester, the harvester may be obligated to deliver catches from other fisheries to

that same processor (K. Olsen, personal communication, February 14, 2014). In this way, the processor indirectly controls the licenses that they did not own or lease. In some rare cases, harvesters who are unwilling to agree to certain contractual obligations have been "blacklisted" by processors; the aforementioned newspaper article states that that when the fisher in question arrived at the dock with his catch "at least two byers had been advised not to deal with him" (The Fisherman, 1998). Garvey and Giammarino (1996) detail the nuances of contractual obligations in their report, which includes non-price competition.

4.5.1.3 Non-price competition

Non-price competition involves the processors competing for the catch of the independent harvesters by offering other goods and services that are not included in the ex-vessel price of the catch. These non-price items can include ice, gear, vessels or vessel repair, packing or collection services, or even bonuses offered in secret to the skipper (Pinkerton, 1987 as cited in Garvey & Giammarino, 1996), which masks the true price being paid for the catch. This would demonstrate failure of the processors to collude on price suppression (meaning that oligopsony power would be decreased or diminished and competition restored), but Pinkerton argued that the bundle of goods and services produces "a net stream of payments which is less than the competitive spot-price" (p. 13). It is uncertain which of these two situations is the case.

Indirect corporate control through leases, contractual obligations, and non-price competition is not an easy investigation. This would likely require extensive interviews and surveys with fishing industry participants for their experiences with these types of arrangements. Because of the need to protect privacy and participant confidentiality in these cases, an ethics review as

mandated by the University of British Columbia's Office of Research Ethics would have been required. Because the extensive work required for interviews and ethical obligations associated with them, this area of investigation was deemed outside the scope of this thesis, but a fruitful area of consideration for future research.

4.5.2 Oligopsonies: using Concentration Ratios, the Herfindahl-Hirschman Index, and Buying Power Index

Market structures can range from perfect competition to perfect monopoly on the demand side of markets, and from perfect competition to perfect monopsony on the supply side of markets. An oligopsony (like monopoly) is inefficient according to economic theory, and collusion amongst fish processors in the fishing industry would be required to ensure that they are able to exercise some form of power over ex-vessel prices. Oligopsony power in agricultural markets highlights one of the most interesting facets of this market structure: perishability of raw products. Authors note that this causes high shipping costs, restricted choice of potential buyers based on geography, and barriers to exit in the form of sunk costs (Rogers & Sexton, 1994) (in this case it could be fishing vessels, gear, and financing debts if they do not own the license or vessel outright). This perishability creates a price inelasticity of supply (the supply of raw product is insensitive to the current market price), leaving a monopsonist or oligopsonists with the ability to exercise power over price (Rogers & Sexton, 1994; Grimes, 2005). This has been shown to happen in agricultual markets as varied as tomatoes (Just & Chern, 1980) to farmed catfish (Kinnucan & Sullivan, 1986). The ability of a few large processors to control the market (and hence the ex-vessel prices received) has been a concern in the Pacific fisheries for some time now, particularly since all the companies who were members of the Fish Processors Bargaining

Association (the body which carried out negotiations with the UFAWU on price agreements) has been dissolved (The Fisherman, 1999); a single large fish processor (the same mentioned in Chapter 3) has bought up all the others.

In order to measure the CR*n* or HHI, one needs to know the share of the market held by the processors, or the volumes of the total catch that each processes. The British Columbia Ministry of Agriculture maintains a 'three-party rule' with regards to releasing the volumes of products that are produced by each processor[12], meaning that the market share held by individual seafood processors cannot be ascertained and CR*n* and HHI cannot be calculated. A report on access to federal fisheries data outlines the challenges and justifications for these types of three-party rules (Edwards, Gray, & Reid-Kuecks, 2008). If government policies surrounding access to this type of information change, it would be interesting to investigate further the concentration of fish processors.

Blair and Harrison (2010) argue that market share is not as useful an indicator for measuring monopsony or oligopsony power, but rather that buying power index (BPI) is more revealing. The BPI is indicative of the ability to suppress price by restricting purchases (Blair & Harrison, 2010), and is the reciprocal of price elasticity of supply, which is determined from the supply schedule or the supply curve. As price elasticity of supply rises, the BPI decreases. Supply curves are based on the premise that firms (harvesters) will produce products (fish) so long as their marginal profits (prices received for catches) exceed their marginal costs, which include

[12] See the policy online at: http://www.env.gov.bc.ca/omfd/fishstats/forms/files/processor_AFPS_letter.pdf [accessed June 7, 2014].

opportunity costs (the cost of foregoing the next best alternative). Harvesters of capture fisheries are likely to have lower opportunity costs, due to the specific nature of their skills gained on-the-job which are not easily transferable, living often in remote coastal communities with minimal alternative employment, and lower levels of educational attainment (Copes 1988, as cited in Cunningham, 1994), and as shown in recent labor force surveys (GSGislason & Associates Ltd, 2013). Lastly, 'firms' would also normally respond to market price in their determination of how much product to supply to the market, but it is more likely that harvesters of wild fish are responding to prices paid by fish processors (ex-vessel prices), rather than *market* (wholesale) prices. All of these factors make estimation of a supply curve difficult, and to my knowledge, few supply curves for wild fish exist. It follows therefore that price elasticity of supply is also extremely difficult to estimate, and carrying out any analysis using the Buying Power Index derived from price elasticity could not be conducted here because the necessary parameters were unavailable.

4.6 Recommendations and applications of the research

As social goals such as equity and fairness find themselves increasingly on the agenda of fisheries policymakers, so too should the articulation and inclusion of these goals in fisheries management objectives. Currently, these objectives are not given the attention that the objectives regarding ecological and economic goals are; a scan of the DFO Integrated Fisheries Management Plans for these fisheries found no objectives surrounding equity and fairness in the access to the resource (the exception being that First Nations access is in fact well articulated). While appropriate and practical methodologies such as the ones demonstrated in this analysis exist to provide indicators of concentration and distribution, difficulties in implementing them

still exist. Several challenges have arisen during the course of this investigation, and recommendations are given here on how to ameliorate them; as well, recommendations are provided based on the results that were found through this analysis.

The types of licenses issued by DFO (party-based and vessel-based) make tracking of ownership and leasing challenging. Given that equity and fairness are increasing in saliency for policymakers, it would be beneficial for these ownership and lease arrangements to be tracked (at least differently), should DFO not wish to be the holder and/or the lessor of licenses instead as was suggested in the Cruickshank (1991) report. As well, the voluntary "Cost and Earnings Survey" could be reinstated to better track all costs (including lease fees) fishers face. A survey on the interest of all fishers (holders of Fisher Registration Cards, not simply license holders) could be held to determine the interest in "owner-operator" policies, with the results used to gauge DFO's future policy direction in this area. Lastly, inclusion of objectives related to social goals could be given further consideration in DFO's IFMPs.

It is hoped that this research will be applied to guide policymakers going forward with access and allocation decisions in Pacific fisheries, particularly given the interest in moving the Pacific salmon fishery towards catch-shares management. It seems pertinent to address concerns over distribution of fisheries benefits in access and allocation as early as possible in the phases of management. Catch-shares may have the potential to exacerbate concentration of access and allocation, especially if the social issues of equity and fairness are not considered alongside those of ecological sustainability and economic efficiency as fisheries policies are designed.

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Appendices

Appendix A

A list of license categories used by DFO, as well as whether or not each is subject to area licensing and if stacking of multiple licenses of the same category is permitted. Source: http://www-ops2.pac.dfo-mpo.gc.ca/vrnd-rneb/index-eng.cfm?pg=PrefixDsc, amended with additional information; and West Coast Fishing Fleet: Analysis of Commercial Fishing Licence, Quota, and Vessel Values as at March 31, 2010. Stuart Nelson for DFO, Pacific Region. October 2010.

License category and description		Area licensing	Stacking of multiple licenses of the *same* category
AG	Salmon by Gill Net	North (C); Johnstone Strait / Barclay Sound (D); Fraser River (E)	Since 1996
AS	Salmon by Seine	North (A); South (B)	Since 1996
AT	Salmon by Troll	North (F); West Coast Vancouver Island (G); Strait of Georgia (H)	Since 1996
A	Salmon by Troll and Gillnet (Historical)	Coastwide	N/A
C	Schedule II Species by Hook and Line	Coastwide	One per vessel
CA	Schedule II by Hook and Line - Special Issue	Coastwide	One per vessel
D	Packing	Coastwide	N/A
G	Geoduck & Horseclam by Dive	North Coast; WCVI; Inside waters of Vancouver Island (selected annually)	Since 1989, up to three licenses per vessel, amended to five per vessel in 2012
HG	Herring Roe by Gill Net	QCI; North; Central; WCVI; Strait	Pooling of licenses

License category and description		Area licensing	Stacking of multiple licenses of the *same* category
		of Georgia (selected annually)	mandatory (4/pool)
HS	Herring Roe by Seine	QCI; North; Central; WCVI; Strait of Georgia (selected annually)	Since 1998, maximum of two licenses per vessel, restriction removed in 2013 (minimum 8/pool)
I	Import	-	N/A
J	Herring Spawn On Kelp by Purse Seine		No – party-based
K	Sablefish by Longline or Trap	Coastwide	-
L	Halibut by Hook and Line	Coastwide	-
NAG	Salmon by Gill Net – Northern Native Fishing Co	See AG; North (C)	
P	Processing	-	
R	Crab by Trap	A; B; E; G; H; I; J	(must select single area); "trap stacking" is allowed
S	Shrimp by Trawl		
SEC68	Section 68 - HIGH SEAS, in international waters	-	
T	Groundfish by Trawl	Coastwide	-
USA68	Section 68 - Albacore Tuna in USA waters	-	
W	Prawn And Shrimp by Trap	Coastwide	"trap stacking" (additional traps may be placed on a license)
YH	Export - herring	-	
YS	Export - salmon	-	
Z2	Clam by Hand Picking or Hand Digging	North (A); Johnstone (B); Sunshine Coast (C); Upper Strait of Georgia (D); Lower Strait of Georgia (E); WCVI (F); QCS (G)	
Z8	Smelt by Gill Net or Setnet		

License category and description		Area licensing	Stacking of multiple licenses of the *same* category
ZA	Green Sea Urchin by Dive	Five areas in the Johnstone Straight and Lower Straight of Georgia	Party-based, but may hold up to five licenses per vessel
ZC	Red Sea Urchin by Dive	North; South	Party-based, but may hold up to five licenses per vessel
ZD	Sea Cucumbers by Dive	North; Central; WCVI; Strait of Georgia	Up to five per vessel, restriction removed in 2011 - unlimited
ZE	Opal Squid by Hook and Line or Seine		
ZF	Euphausiid by Pelagic Trawl		
ZK	Anchovy by Seine		
ZL	Surf & Pile Perch by Net		
ZM	Herring bait lottery	-	
ZN	Rockfish by Hook and Line	Inside (Inside waters / Strait of Georgia) (ZNI designation); Outside (rest of coast) (ZNO)	-
ZS	Sardine by Seine		
ZU	Eulachon by Gill Net		
ZX	Herring bait	Gulf; North	
ZY1	Herring bait - sport		
ZY2	Herring bait - commercial		
ZY3	Herring bait - domestic food		
ZY4	Herring bait - zoo/aquarium		
ZY5	Herring bait - research		
ZY6	Herring bait - charity		

Appendix B

A complete list of every license category listed in the data provided by DFO for all Pacific fisheries for the years 1989-2013, as well as their inclusion and exclusion from the analysis and justification for doing so.

Category	Description	Years in which it was an active category in the time period being studied	Included in analysis	Comments
A (aka AC)	Salmon by gillnet and troll	1989-1995	✓	
AG	Salmon by gillnet	1989-2013	✓	
FAG	Salmon by gillnet – Aboriginal/communal	1994-2013	✓	
NAG	Salmon by gillnet – Northern Native Fishing Corporation	1996-2013	✓	
NAC	Salmon by gillnet, seine or troll – Northern Native Fishing Corporation	1989-1995	✓	
AR	Salmon by troll	1989-1995	✓	
AS	Salmon by seine	1989-2013	✓	
AT	Salmon by troll	1996-2013	✓	
ATBR and	Salmon by gillnet or fishwheel	2013	×	

Category	Description	Years in which it was an active category in the time period being studied	Included in analysis	Comments
AYR				
C and CA	Schedule II species (dogfish, flounder, sole, Pacific cod, sturgeon, eulachon, skate, lingcod, `tuna, and smelt)	2002 -2013 (for C); 1996-2008 (for CA)	✓	CT category for tuna (2013 only) excluded; DF category (excluded) is Schedule II for dogfish by hook and line (2006-2013)
CSO, CS, and CSS	Contaminated shellfish	2006-2013	×	CSO = oysters; CS = clam; CSS = scallop
E	Abalone	1989-1990	×	
EEZ	Foreign fishing vessel	2005-2013	×	
G	Geoduck and horseclam	1989-2013	✓	
HG	Herring roe by gillnet	1989-2013	✓	
HS	Herring roe by seine	1989-2013	✓	
I	Import and foreign fishing vessel	2002-2006	×	Import licenses[13]; foreign fishing vessels[14]

[13] Issued only in 2002 (and one in 2006) for salmon, halibut and herring (most likely captured in Alaska and brought to BC for processing).
[14] Issued in 2003 and 2004 for salmon, halibut and herring.

Category	Description	Years in which it was an active category in the time period being studied	Included in analysis	Comments
J	Herring spawn on kelp by seine	1989-2013	✓	
K	Sablefish by longline or trap	1989-2013	✓	
L	Halibut by hook and line	1989-2013	✓	Category LC (excluded) is Schedule II for lingcod by hook and line (2006-2013)
P	Processing on board	A (1996-1997); G (1989-1993); S (1989-1992)	×	Suffix: A=salmon; D=not specified[15]; G=goeduck and horseclam; K=skate species; R=crab[16]; S=sea cucumber[17]
Q	Licenses held in a DFO inventory	2006-2013	×	These licenses are for halibut, sablefish, rockfish, groundfish trawl, and Schedule II species[18].
R	Crab by trap	1990-2013	✓	Some licenses carry a provision for

[15] Only one license issued over five different years.
[16] Only one license issued over three different years.
[17] Total of nineteen licenses issued over 4 different years.
[18] The licenses are for a variety of purposes, such as the Allocation Transfer Program (ATP), the PICFI program (previously discussed), and the Aboriginal Aquatic Resources and Ocean Management (AAROM) program, among others.

Category	Description	Years in which it was an active category in the time period being studied	Included in analysis	Comments
				octopus
S	Shrimp by trawl	1989-2013	✓	
SEC68	High seas fishery	1996-2013	×	For tuna (1996-2012), sablefish (1996-2013), and neon flying squid (1996-1999)[19]
T	Groundfish trawl	1989-2013	✓	
USA68	U.S.A. Albacore tuna	2003-2013	×	
W	Prawn by trap	1993-2013	✓	Some licenses carry a provision for octopus
X	Various (see comments)	1993-1994	×	Suffix: 1=salmon by gillnet, seine or troll; 2=herring roe gillnet; 3=clam hand harvest; 4= "shellfish" (only two licenses); 5= unspecified[20]
YH and YS	Export	YH (1992-2003); YS (1990-2005)	×	Unspecified species

[19] One license issued in 1996 and 1997 for rockfish, and one license issued in 2006 for herring spawn on kelp.
[20] Only one license, issued to a fish buying station.

Category	Description	Years in which it was an active category in the time period being studied	Included in analysis	Comments
Z	Herring roe by gillnet or seine	2001-2006	×	[21]; also one license in 2000 and 2001 of category ZRH issued to the same holder
Z1	Mussels by hand harvest	1989-1992	×	
Z2	Clams by hand harvest	1989-2013	×	Suffix ACL for Aboriginal use (1998-2013)
Z6	Gooseneck barnacle by hand harvest	1989-1999	×	
Z8	Smelt by net	1989-2013	✓	
Z9	Eulachon by gillnet	1989-1996	×	
ZA	Green urchin by dive	1989-2013	✓	
ZB	Scallop by dredge	1989	×	
ZC	Red urchin by dive	1989-2013	✓	
ZD	Sea cucumber by dive	1989-2013	✓	
ZE	Opal squid by hook and line or seine	1989-2007	×	
ZF	Euphasiid by pelagic trawl	1989-2013	✓	

[21] Issued to the Herring Conservation and Research Society.

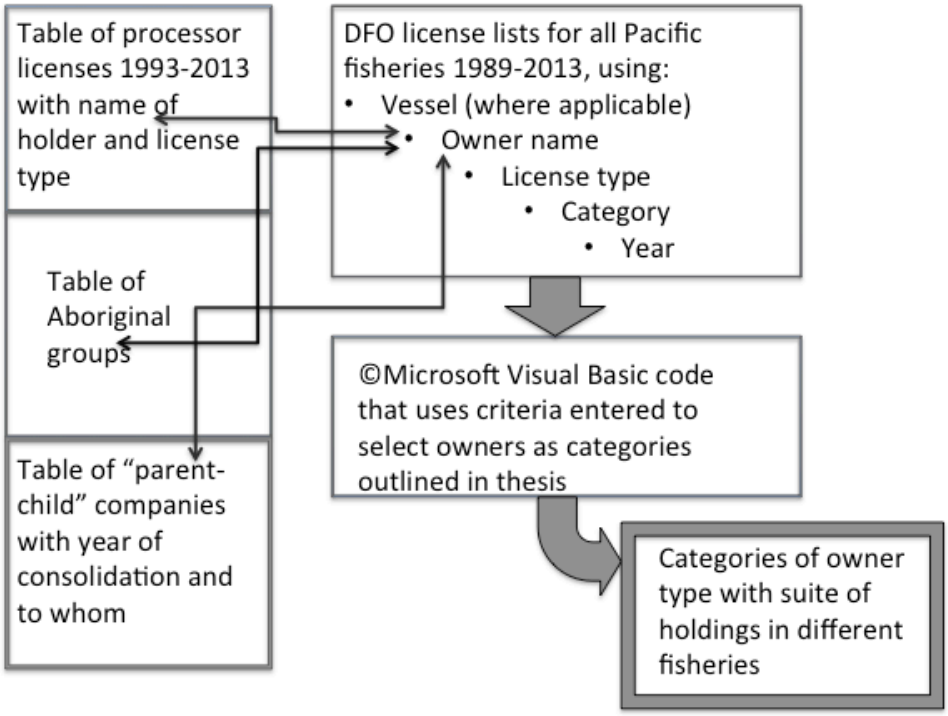
Category	Description	Years in which it was an active category in the time period being studied	Included in analysis	Comments
ZG	Octopus by dive	1992-1999	×	
ZH	Shrimp by trap	1989-1992	×	
ZI	Pink and spiny scallops by dive	1989-1999	×	
ZJ	Octopus by dive or trap	1989-1991	×	
ZK	Anchovy by seine	1989-2002	×	
ZL	Surf and pile perch by hook and line or seine	1989-2010	×	
ZM	Herring for food and bait by seine	1989-2013	✓	
ZN	Rockfish by hook and line	1989-2013	✓	
ZO	Six-gill shark by longline	1989-1993	×	
ZP	Octopus by trap	1992-1998	×	
ZR	Pink and spiny scallops by trawl	1993-1999	×	
ZS	Pacific sardine by seine	2002-2013	×	
ZU	Eulachon by gillnet	2000-2013	×	
ZWO	Pacific oysters by hand harvest	2012-2013	×	
ZX	Herring for bait by gillnet, seine or trawl	1995-2013	✓	

Category	Description	Years in which it was an active category in the time period being studied	Included in analysis	Comments
ZY(1-6)	Herring for bait and special use (various gears)	1995-2013	×	Issued for a variety of purposes, such as the UFAWU Charity Herring Sale, among others[22].
ZZA	Atlantic salmon by seine	2003-2010	×	For use in aquaculture operations

[22] As another example, all ZY4 licenses are issued to the Vancouver Aquarium to allow the harvest of herring to feed the marine mammals in their care.

Appendix C

A diagrammatic representation is presented here to provide a visual aid to the structure and working of the database used in the analysis. While the database is much more complex than what is detailed below, it is merely an overview to aid in understanding how the information was linked and used.



Appendix D

Results of the uncertainty analysis are presented on the following pages, along with a description of the criterion that was changed in each case. The results are presented as proportions of the licenses in the salmon and herring fisheries that are being held by Aboriginal groups, "corporations" (that is, all fish processors and "licenses investors" identified in the analysis), and independent operators. The original criteria presented in Chapter 3 were used initially, with its results displayed for the salmon and herring fisheries. Then, each criteria adjustment is listed, with its corresponding results for the salmon and herring fisheries. Changes to these criteria do not affect how processors or Aboriginal organizations were identified, and since the processor results remained the same due to not modifying that criteria, the results presented here largely affect how *independent* and *"license investor"* proportions changed (as processors and "license investors are grouped together here), which is where the majority of the uncertainty lay in this analysis.

D.1 Salmon fishery (all gears)

Original criteria	Year	Aboriginal	"Corporations"	Independent
	1993	6%	16%	77%
	1996	7%	17%	76%
	2000	16%	14%	71%
	2004	17%	14%	69%
	2008	18%	14%	68%
	2012	23%	14%	63%
Criteria change: >2 vessels into >3 vessels	Year	Aboriginal	"Corporations"	Independent
	1993	6%	11%	83%
	1996	7%	13%	80%
	2000	16%	12%	72%
	2004	17%	12%	71%
	2008	18%	12%	70%
	2012	23%	13%	63%
Criteria change: >3 category A licenses to >6 category A licenses	Year	Aboriginal	"Corporations"	Independent
	1993	6%	16%	77%
	1996	7%	17%	76%
	2000	16%	13%	71%
	2004	17%	13%	70%
	2008	18%	13%	69%
	2012	23%	12%	64%
Criteria change: >2 salmon seine licenses into > 1 salmon seine license	Year	Aboriginal	"Corporations"	Independent
	1993	6%	17%	77%
	1996	7%	18%	75%
	2000	16%	16%	68%
	2004	17%	16%	67%
	2008	18%	16%	66%
	2012	23%	16%	61%
Criteria change: considered AT and AG licenses as different from A licenses from 1996 onward (but still not >3 of each)	Year	Aboriginal	"Corporations"	Independent
	1993	6%	16%	77%
	1996	7%	17%	76%
	2000	15%	14%	71%
	2004	16%	15%	69%
	2008	17%	15%	68%
	2012	22%	16%	63%
Criteria change: >1 shrimp/crab/trawl/halibut/ sablefish license into >2 shrimp/crab/trawl/halibut/ sablefish license	Year	Aboriginal	"Corporations"	Independent
	1993	6%	16%	78%
	1996	7%	16%	77%
	2000	16%	13%	72%
	2004	17%	13%	70%
	2008	18%	13%	69%
	2012	23%	13%	63%

D.2 Herring fishery (all gears/products)

Original criteria	Year	Aboriginal	"Corporations"	Independent
	1993	1%	24%	75%
	1996	1%	30%	69%
	2000	1%	34%	64%
	2004	3%	36%	62%
	2008	5%	37%	58%
	2012	8%	43%	49%
Criteria change: >2 vessels into >3 vessels	Year	Aboriginal	"Corporations"	Independent
	1993	1%	22%	77%
	1996	1%	28%	71%
	2000	1%	33%	65%
	2004	3%	35%	62%
	2008	5%	37%	58%
	2012	8%	43%	49%
Criteria change: >2 herring seine licenses into >1 herring seine license	Year	Aboriginal	"Corporations"	Independent
	1993	1%	26%	73%
	1996	1%	31%	68%
	2000	1%	36%	63%
	2004	3%	37%	60%
	2008	5%	39%	56%
	2012	8%	45%	47%
Criteria change: >4 herring gillnet licenses into >2 herring gillnet licenses	Year	Aboriginal	"Corporations"	Independent
	1993	1%	32%	67%
	1996	1%	40%	59%
	2000	1%	46%	53%
	2004	3%	48%	49%
	2008	5%	49%	46%
	2012	8%	53%	39%
Criteria change: >4 herring gillnet licenses into >1 herring gillnet license	Year	Aboriginal	"Corporations"	Independent
	1993	1%	46%	53%
	1996	1%	52%	47%
	2000	1%	58%	41%
	2004	3%	60%	37%
	2008	5%	61%	35%
	2012	8%	62%	30%
Criteria change: >1 shrimp/crab/trawl/halibut/ sablefish license into >2 shrimp/crab/trawl/halibut/ sablefish license	Year	Aboriginal	"Corporations"	Independent
	1993	1%	24%	75%
	1996	1%	30%	69%
	2000	1%	34%	65%
	2004	3%	35%	62%
	2008	5%	37%	58%
	2012	8%	43%	49%