

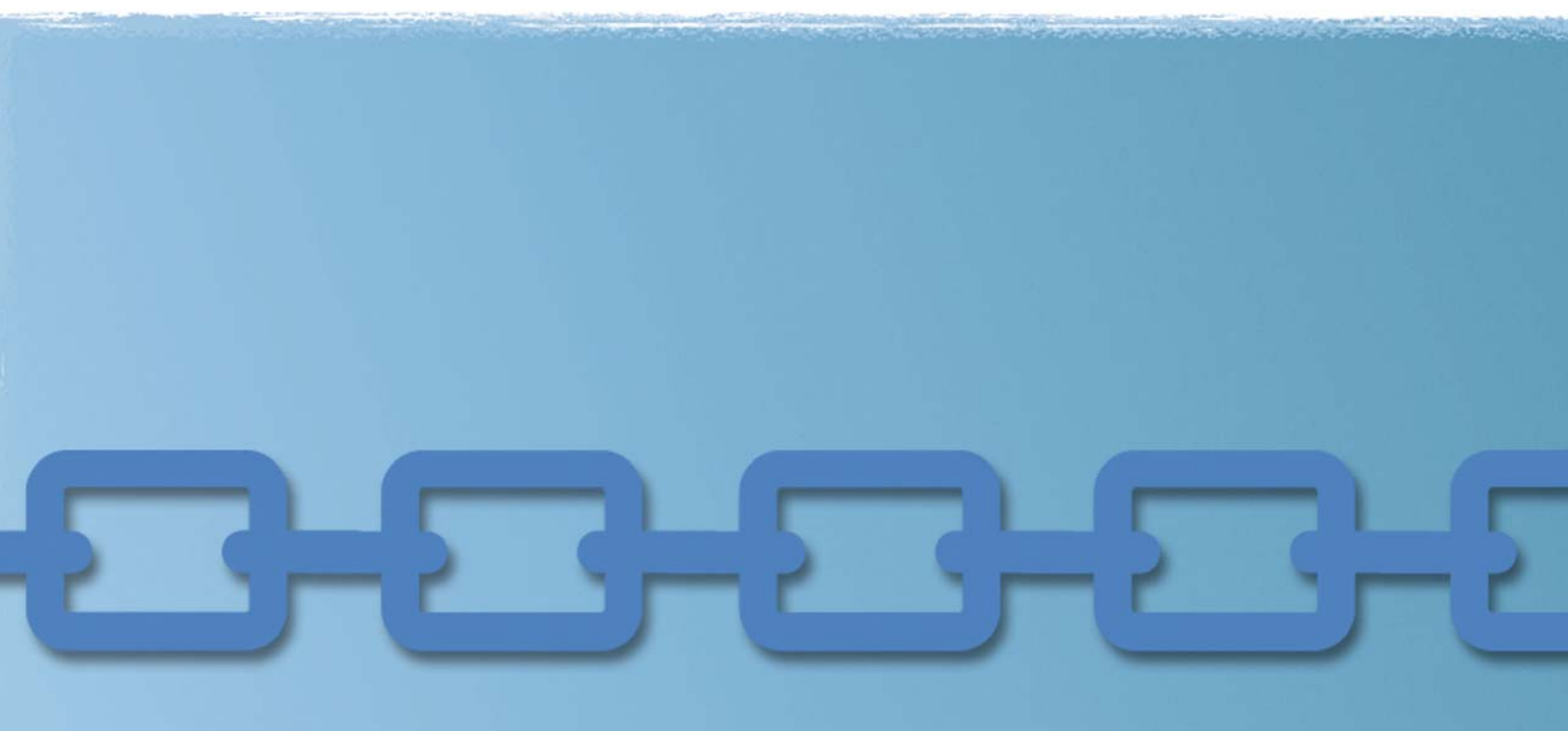
Valuing our Fisheries

Breaking Nova Scotia's Commodity Curse

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January 2013



Ecology Action Centre



Acknowledgements

This report was prepared in late 2012 as part of the J.W. McConnell Family Foundation's Regional Value Chain Program. We would like to thank the Foundation for their generous support in funding this assessment as well as the individual fishermen, buyers, processors, distributors, retailers and chefs who gave generously of their time and knowledge in offering insights that helped us evaluate Nova Scotia's seafood supply chains. We are also grateful to the staff of Fisheries and Oceans Canada and Nova Scotia's Department of Fisheries and Aquaculture who provided a wealth of data that proved to be invaluable.

In the preparation of this report we worked closely with Bob Haugen and Lynn Foster of LocEcon: Local Economic Development (locecon.org). LocEcon works to help people analyze and improve their local economies by modeling local economic clusters. The project is currently in collaborative development with invited communities and we greatly appreciate the volunteer time and effort spent working with Nova Scotia fisheries data.

Although this report could not have been completed without the assistance of these partners, any errors, oversights or inaccuracies are the fault of the authors of this report.

About the Ecology Action Centre

Since 1971, the Ecology Action Centre has been working to build a healthier, more sustainable Nova Scotia. The EAC works closely with social and natural scientists and makes strong use of science in communicating its message to the public.

The Centre's earliest projects included recycling, composting, and energy conservation, and these are now widely recognized environmental issues. Our current areas of focus include Built Environment, Marine Issues, Coastal Issues, Wilderness, Food, Transportation and Energy Issues

The Marine Issues Committee works locally, nationally and internationally towards conserving and protecting marine ecosystems and maintaining sustainable fisheries and vibrant coastal communities.

Founded in 1995, following the collapse of the east coast cod fishery, the Marine Issues Committee uses a variety of tools to achieve our marine conservation objectives. We advocate, conduct research, engage in public education, and use market-based approaches and legal tools to achieve our campaign goals. Collaborative efforts with Canadian and international NGOs, scientists, fishing organizations and government agencies are integral to our approach.

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Executive Summary

Atlantic Canada has joined much of the rest of the world in a race to produce high volumes of low cost protein for global commodity markets. In Nova Scotia, independent fishermen who act as ‘owner-operators’ of vessels are increasingly unable to make a living by fishing. Processing plants are closing, taking with them valuable employment opportunities, and Nova Scotia’s rural population continues to decline. The only remaining fishery that inshore fishermen can reliably earn a living from is lobster; however, this reliance on a single species is dangerous. Even the small drops in prices that have been seen over the past years have major impacts across the province.

This report explores Nova Scotia’s existing fishery value chains and identifies opportunities for increasing the value of environmentally sustainable inshore fisheries. These fisheries tend to be composed of owner-operated vessels that are based in a large number of relatively small and widely dispersed communities. The strategies and conclusions suggested in this report will not apply to Nova Scotia’s entire seafood industry, but to a subset of environmentally sustainable, low-impact, owner-operator fleets that nevertheless represent the bulk of fishing activity in the province.

Approximately 2.2 million kg of seafood are consumed annually in Nova Scotia, and there is an expressed interest in fresh, local and ‘sustainable’ seafood products. However, the majority of consumers purchase seafood that reaches them through a complex value chain that can include numerous actors, intermediate processing steps, and processing and packaging in other countries.

Fishery Value Chains

A value chain is defined here as a range of activities required to bring a product from harvest, through intermediary processing, and to the final consumer.

In order for each level of a value chain to receive appropriate prices, several basic market conditions must be met. Among these are access to markets, equal market power among individual companies at each stage of the value chain, and transparent, accurate, and timely information about price and quality. Often, fishermen in Nova Scotia have access to a small number of buyers and have no reliable access to pricing information further down the chain. Fishermen generally do not know whether they are getting a fair price for their catch. In this case, fishermen are price takers: they take whatever price their buyer gives them. These prices may not reflect the actual operating costs or the potential to receive more for higher value products.

The most successful strategy identified to increase direct return to small-scale fisheries requires product differentiation and regional marketing of the seafood products that support and empower low-impact, owner-operator fishermen. Some consumers are very willing to support food producers and community development by paying higher prices for seafood – provided they know where the extra money is going. However, most market actors in the sectors examined now compete based on price alone. There are few opportunities to distinguish products or to support traceability and branding in marketing. The current structure of the industry promotes a transactional model where actors work to underbid each other for sales and connections.

Certain gear types have clear environmental benefits over others; for example, bottom longline gear does not destroy fishery habitats the way that trawl gear does. However, social and economic factors are also important and environmentally benign fishing methods often have social benefits as well. Every haddock harvested by bottom longline gear generates 3.3 times more employment hours than those caught with trawl gear. This means that supporting the bottom longline sector of the industry can be both an environmental and social gain as more people are employed catching the same number of fish. In order to provide a living wage in this sector, the value of the catch must be increased by accessing the market's demand for meaningfully sustainable seafood that empowers and supports small-scale producers.

Losing Product Value

The availability, price and quality of raw materials are the most significant challenges facing Nova Scotian fish processors and distributors today. There is strong competition for unprocessed fish and difficulty for some plants maintaining levels of activity sufficient to justify capital investments. Due to high labour costs, it does not make sense to process the bulk of Nova Scotia's seafood in Canada without smaller volumes of seafood being differentiated and directed towards a consumer base supportive of food producers and rural economies

Haddock exports represent the most significant loss of value in groundfish species, as only 5.7% of exported weight is in the most valuable form of fresh fillets. By failing to process haddock in the province, Nova Scotia lost over \$7 million in direct export revenue in 2011. Over the past four years the export of whole haddock and re-import of haddock fillets has directly cost Nova Scotia's GDP between \$5 and \$20 million each year, not accounting for the economic impact of employment in processing. However, exporting unprocessed seafood is not only a loss of product value and employment opportunities, but also a lost opportunity to distinguish products. Large shipments of seafood commodities do not allow producers to provide the traceability and story-telling that consumers are willing to pay higher prices for.

Regional distribution remains one of the key deficiencies in the Nova Scotia's seafood sector. The post-harvest supply chain of seafood is aligned with the international commodity market, resulting in some of Nova Scotia's finest seafood products being shipped overseas or to the Northeast US. The result is that local chefs, retailers, and consumers have only sporadic access to fresh seafood, and seafood harvesters are beholden to the international market.

Solutions

If the seafood industry in Nova Scotia is to thrive, it must transition away from a single focus on exporting high volumes of commodity products for low prices. Recreating an industry that supports a resilient, regional food system will require moving away from a model where individual actors work at cross purposes to 'push' products to market, and towards a value chain alliance based on market demand, where members of the chain share strategic information in order to ensure its long term competitiveness. This will create the opportunity to develop an integrated value chain that provides higher value products to a regional food system.

There are numerous opportunities in Nova Scotia to develop a regional seafood value chain network. In preparing this report, the Ecology Action Centre has explored these by:

- Shipping sustainably caught, tagged, and traceable groundfish directly from fishermen throughout Nova Scotia and Central Canada;
- Developing a scallop dive fishery that will allow quota to be used to catch valuable diver-caught scallops rather than in the destructive and lower-value dredge fishery;
- Connecting 'hand-dug' clam harvesters with innovative restaurants in Halifax that will be featuring steamed clams on menus this summer;
- Helping the innovative shrimp trap fishermen in Chedabucto Bay distinguish their product from that of industrial shrimp trawlers;
- Creating an 'asset map' for areas in the province where clusters of fishing and processing activities and farmers markets can support a network of direct marketing initiatives; and,
- Building a network of fishermen, processors, distributors and restaurant/retailers who want to work with us to change the future of Nova Scotia's fisheries.

In each case, harvesters have secured a higher price by establishing a market demand and then connecting industry partners to supply the product. Over the coming months and years, this work can expand through the creation of a regional seafood hub based on empowering small-scale, environmentally sustainable producers to connect with a regional market that provides the prices they need to stay in business. Most importantly, this shift to increase value in the sector will allow many of Nova Scotia's small-scale fisheries to continue to make an essential contribution to the economic and social well-being of rural communities throughout the province.

1. Introduction

About this report

This report was written to explain how Nova Scotia's existing fishery value chains operate and to analyze the costs and missed opportunities caused by the current chain structures. It proceeds by examining regional demand and market trends for Nova Scotian seafood and sustainable seafood in general, and examines groundfish value chains in particular. The report identifies trends and challenges in the sector and proposes new approaches to address them based on the Ecology Action Centre's experiences working in these sectors and with national retailers.

Most fisheries have different harvesting options that support more or less environmentally sustainable and economically resilient chains. This report primarily focuses on options for increasing the value of Nova Scotia's environmentally sustainable inshore fleets. These fisheries tend to be composed of smaller owner-operated vessels that are based in a large number of relatively small and widely dispersed communities. These fleets have opportunities to participate in a higher-value regional food system that larger operations – set up to produce large volumes of seafood for low cost export markets – do not. The strategies and conclusions suggested in this report will not apply to Nova Scotia's entire seafood industry, but to a subset of environmentally sustainable, low-impact, owner-operator fleets.

This report identifies a number of opportunities for shifting Nova Scotia and Atlantic Canada's seafood value chains to support regional producers and consumers and provide 'Fresh, Fair Fish' to a regional marketplace. The growing demand for local and sustainable food products is a promising trend. Along with increased push for environmental sustainability, traceability, and resilience in coastal communities, the focus on local food marketing provides an excellent opportunity to push, invest in and develop a regional seafood market.

The Ecology Action Centre's Marine Program

The Ecology Action Centre has been involved in sustainable fisheries work since 1996. This report has been informed and supported by a number of projects, events and research activities.

Our market-based work includes building and managing Off the Hook Community Supported Fishery (CSF), which is a cooperative of small-scale, hook and line fishermen operating a direct-marketing enterprise for fresh groundfish, including cod, haddock and hake. In January 2012, Off the Hook was selected as one of the top three 'Solutions for Coastal Fisheries' in a global competition organized by RARE Planet and National Geographic. Through Off the Hook CSF, we have begun to create an alliance based supply chain supported by consumer pull for sustainably caught seafood. We have been able to build relationships not only with harvesters, but with other members of the supply chain, including processors, distributors, shippers, wholesalers, restaurants, and retailers.

Through our partnership in SeaChoice¹, Canada's Sustainable Seafood Program, and collaboration with OceanWise and 15 other non-profit organizations (Conservation Alliance for Seafood Solutions²) we are

¹ SeaChoice partners include Living Oceans Society, Sierra Club BC, Canadian Parks and Wilderness BC and the David Suzuki Foundation www.seachoice.org

working on gaining retailer and buyer commitment to sustainable seafood purchasing policies in order to further strengthen market demand for sustainable seafood.

Our research about the environmental sustainability of different fisheries and gear types is based on SeaChoice assessments of individual fisheries based on the Monterey Bay Aquarium's Seafood Watch assessment methodology³ as well as a comprehensive analysis of the severity of habitat impacts and discarded bycatch in major commercial fishing gears used in Canada called *How We Fish Matters: Addressing the Ecological Impacts of Canadian Fishing Gear*.⁴

Atlantic Canadian Fisheries

Fisheries drew the first Europeans to settle Atlantic Canada, and plentiful, valuable cod quickly became one of the continent's chief exports. Over the years, groundfish was joined by scallops, swordfish, herring, lobster and other fisheries. Coastal fishing towns that depend on the oceans for their livelihoods can be found throughout the Atlantic Provinces. The well-known collapse of groundfish populations in the early 1990s due to overfishing dramatically changed the fishing industry and should have demonstrated the need for a proactive approach to protect employment in fisheries and the environment that marine animals depend on. However, despite intensive management and restructuring, the fishing industry continues to face challenges.

Atlantic Canada has joined much of the rest of the world in a race to produce high volumes of low cost protein for global commodity markets. In Nova Scotia, independent fishermen who act as 'owner-operators' of the vessels are increasingly unable to make a living in the fishery. Processing plants are closing, taking with them valuable employment opportunities, and Nova Scotia's rural population continues to decline. The only remaining fishery that inshore fishermen can reliably earn a living from is lobster; however, this reliance on a single species is dangerous. Even small drops in prices, which have been seen over the past years, have major impacts across the province.

Wealth being produced in the fisheries is increasingly consolidated by vertically integrated operations that produce high volumes of export products. The business model that makes large volume production attractive relies on what are considered 'economically efficient' gear types. These types of gear remove large volumes of biomass from the ocean and economies of scale allow them to take reduced prices on the global market. At the same time, these 'economically efficient' gear types reduce employment in the fishery and cause environmental damage to habitats and non-commercial species.

Despite massive ecosystem and societal changes, fishing activities are still a cornerstone of Nova Scotia's coastal communities. This industry provides direct and indirect employment in the range of 30,000 people. The industry as a whole has recovered from stock collapses by shifting focus to other species and through increased consolidation, but this re-distribution of the fishery sector has significantly shifted patterns of investment and employment throughout the province. The commercial fishery now

² Conservation Alliance for Seafood Solutions meets annually and works intersessionally to reduce confusion in the market place around sustainable seafood choices and to maximize efficiency in leveraging market change to achieve change on the water.

³ More information available at www.seachoice.org/seafood-recommendations/seachoice-methodology/

⁴ Full report, factsheets and summaries can be found at www.howwefish.ca/

has approximately 5,000 fishing vessels and targets over 30 species. Shellfish, including lobster, scallop, snow crab and shrimp, is the main species group. For groundfish, cod, haddock, flatfishes and hake are the leading species, and herring, swordfish and tuna are the main pelagic species fished.⁵

Healthy, prosperous fishing communities are vital to the economic, cultural and environmental resilience of the province now and into the future. Rural employment from fisheries is particularly important, as Nova Scotia has a higher percentage of rural population than any other Canadian province.⁶ The small-scale fisheries that make up the backbone of many of these communities face particular challenges as the seafood industry continues to change. Federal and provincial policies have also acted as barriers for small-scale fishers, in support and subsidization of large-scale export development and industry consolidation. However, the relative size of small-scale fisheries may also be advantageous in these rapidly changing times. These small family businesses can be comparatively nimble when it comes to adapting and diversifying in changing seafood markets.

⁵ Gardner Pinfold and Rogers Consulting Inc., “Nova Scotia Seafood Processing Sector: State of the Industry and Competitiveness Assessment” (Nova Scotia Department of Fisheries and Aquaculture, August 2007).

⁶ A. Curran, “Taking the Pulse of Active Transportation: Measure the Built Environment for Healthy Communities” (Community Counts, Nova Scotia Department of Finance: Action for Neighbourhood Change, United Way of Halifax Region, 2005).

2. Regional Demand

2.1 Seafood Consumption

Canadians eat an average of 24 kilograms of seafood every year⁷, which amounts to approximately 700,000 metric tons annually consumed throughout the country. Between 65-70% of seafood is purchased through retail/grocery outlets, with slightly over 30% consumed in restaurants.⁸ Grocery store purchases of seafood amount to over two billion dollars each year – most of which is concentrated in the hands of three large retailers that control roughly three-quarters of the Canadian retail food market: Loblaw, Metro and Sobeys.⁹

According to a 2011 survey prepared for the Canadian Aquaculture Industry Alliance (CAIA), the average Canadian eats fish at least three times per month and shellfish twice per month. The consumption of fish and seafood is close to universal in Canada, as almost nine in ten respondents (88%) in this survey said they have eaten fish or seafood in the past three months. This study showed that Atlantic Canadians consume finfish slightly less often than in most other parts of the country, but also that seafood consumption is declining in younger populations.¹⁰ The report does not make a distinction between farmed and wild seafood consumption.

Table 1: Number of Times Respondent Eats Finfish per Month

	Canada	Atlantic	Quebec	Ontario	Central	Alberta	B.C.
Zero times	5%	6%	6%	5%	3%	3%	5%
1 to 5 times	77%	80%	77%	76%	82%	87%	73%
6 to 10 times	15%	13%	14%	16%	14%	8%	20%
Over 10 times	3%	1%	3%	3%	2%	2%	4%
Mean	3.70	3.17	3.72	3.74	3.91	3.03	4.23
	Canada	18-29	30-59	60+	Men	Women	Immigrants
Zero times	5%	9%	5%	3%	4%	6%	5%
1 to 5 times	77%	78%	78%	76%	77%	78%	73%
6 to 10 times	15%	9%	25%	20%	17%	13%	20%
Over 10 times	3%	5%	2%	2%	3%	3%	2%
Mean	3.70	3.50	3.68	3.85	3.82	3.58	3.91

Source: Coletto, Di Francesco, and Morrison, "Seafood Survey: Public Opinion on Aquaculture and a National Aquaculture Act."

According to this study, salmon is the most popular kind of fish consumed across Canada and the most common reason cited for eating fish is due to perceived health benefits. However, while three-quarters of respondents who had eaten fish in the past three months said they eat salmon (74%), most also

⁷ Íslandsbanki, "Per Capita Seafood Consumption."

⁸ Hunter and King, "Out of Stock: Supermarkets and the Future of Seafood."

⁹ Ibid.

¹⁰ Coletto, Di Francesco, and Morrison, "Seafood Survey: Public Opinion on Aquaculture and a National Aquaculture Act."

consumed 'other kinds of fish' (77%).¹¹ However, this study did not examine the consumption patterns of non-farmed species or attempt to identify which other species are most popular.

If Atlantic Canadian consumption reflects per capita national averages, there is approximately 22 million kilograms of seafood consumed annually in Nova Scotia. There is no reliable source of information about consumption patterns available, however some of the most popular seafoods in the province are salmon, groundfish (primarily haddock and cod) and shellfish and crustaceans.

However, supporting a resilient regional food system must include more than simply 'buying local'. More important than 'food miles' is the need to examine the contribution that a product makes to the values that the local food movement is working to support: producer empowerment, rural employment and community development, environmental sustainability, and local food connections and awareness.

2.2 Sustainability Demand

While consumer demand for sustainable / local / organic / responsible food is arguably at an all-time high and continuing to grow, the market and demand specifically for 'sustainable seafood' is at a very different place. Many consumers do not realize that identical species can be harvested in dramatically different ways, with different impacts. The market for sustainable seafood is also complicated by confusing and misleading labelling practices for seafood, lack of consumer proximity to and awareness of the impacts of unsustainable fishing, the complexity of ecosystem impacts of different types of fisheries, and the fact that it is very difficult to correlate 'local' production with 'sustainability' as some terrestrial markets have been able to do.

In 2011, a study commissioned by the Packard Foundation¹² discussed differences between the terrestrial "organic" movement and the "sustainable" seafood movement. In it, the authors suggest several reasons that sustainable seafood has lagged behind organic food:

- Consumers rely on brands to ensure quality, and fresh fish lack brands.
- The word "sustainable" has an unclear meaning, unlike the words "organic" or "free range". With few exceptions (i.e. Dolphin Safe Tuna), the sustainable seafood movement has not been able to articulate a message that resonates with consumers.

Figure 1: Nova Scotians enjoy 22 million kg of seafood each year. Photo credit: Dave Adler



¹¹ Ibid.

¹² Cheryl Dahle, Changing the Future of Wild Fish: An Entrepreneurial Approach to Sustainable Solutions, Reimagining Complex Systems, Ashoka Changemakers (Discovery Group and Ashoka Initiative, 2009), <http://fof.centralstory.com/fof/wp/wp-content/uploads/2009/07/FutureFishReport.pdf>.

- Consumers see a disconnection between the urgent call from environmentalists to buy sustainable seafood and the ample supply of cheap fish at the supermarket. They think: ‘If the oceans are in trouble, then why can I buy cod for \$3 a pound any time I want it?’
- Consumers are confused by the number and variety of seafood labelling systems, and retailers and restaurant staff are generally uninformed about seafood choices
- The general public feels apathetic towards fish, fishermen, and the oceans. Fishermen may not share the same image as farmers (approachable, trustworthy, wholesome and hardworking).

Nevertheless, consumer surveys and retailer experiences do show that Canadians are increasingly concerned with local and sustainable food purchasing. In the 2011 survey completed for CAIA, respondents reported that having the ability to buy locally grown protein year round was highly important (38% very important, 43% somewhat important). Food produced sustainably was less important than access to fresh or local food. However, a large majority of respondents (73%) still rated environmental sustainability as either very or somewhat important.¹³

A number of other surveys of Canadian consumers show demand for sustainable seafood products:

- 91 per cent of Canadians feel “it is important that fish and other seafood on sale in Canada come from sustainable and non-overfished stocks”¹⁴ and 65 per cent of Canadians “look to retailers and producers for information about where seafood comes from”.¹⁵
- According to an Angus Reid poll of 1,028 Canadian seafood consumers conducted in 2008:
 - Over 80% of consumers are concerned about future seafood supplies;
 - 80% are interested in learning more about sustainable seafood; and,
 - 90% are interested in better labeling.

Despite the expressed interest in fresh, local and ‘sustainable’ seafood products, the majority of consumers purchase seafood that reaches them through a complex value chain that can include numerous actors, intermediate processing steps, and processing and packaging in other countries. The following section of the report examines how seafood moves through the province of Nova Scotia and how it reaches consumers in conventional chains.

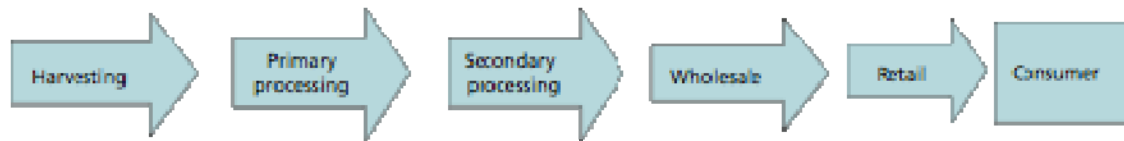
¹³ Ibid.

¹⁴ WWF Canada and EKOS Research Associates, WWF Sustainable Seafood Survey, June 2011.

¹⁵ Ibid.

3. Fishery Value Chains

A value chain is defined here as a series of steps or range of activities required to bring a product from production (harvest), through intermediary processing to the final consumer.¹⁶ A general depiction of a seafood value chain schematic is shown below:



Source: Gudmundsson et al. (2006)

In order for each level of the value chain to receive appropriate prices, several basic economic market conditions must be met. Among these are access to markets, equal market power among individual companies at each stage of the value chain, and transparent, accurate, and timely information on price and quality throughout the supply chain. Often, fishing villages in the Maritimes are in remote locations, have access to only one or two buyers, and have no access to pricing information further down the value chain. **Fishermen generally do not have access to what price is being paid by the final consumer, so they have no idea whether they are getting a fair price for their catch. In this case, fishermen are price takers: they take whatever price their buyer gives them, as they have no other choice.** Online access to information through a buyers' and sellers' auction may alleviate this problem.¹⁷

It is generally true that the less processed a food is when it reaches the final consumer the higher percentage of price will go to the primary producer. According to the USDA, in the US agricultural sector in 2000, farmers received 48% of the final price for raw broiler chickens, and only 14% for fried chicken dinners. Potato farmers received 17% of the final price for fresh potatoes, and only 10% for French fries. Gudmundsson et al. found similar trends when comparing value chains in four fisheries in four different countries. Fisheries involving highly processed small pelagics (canned herring and sardines) exhibited similar characteristics as did highly processed agricultural products, with harvesters receiving 4-8% of the total value of the product. For fisheries involving less processed demersal fish (fresh or frozen cod and perch), harvesters received between 16-18% of the total value.¹⁸

3.1 Atlantic Groundfish

The Atlantic groundfish fishery, with cod, haddock, flatfishes and hake as the leading species, once accounted for over 50% of Nova Scotia's fishing industry. Since the collapse of groundfish populations, the fishery's value has been eclipsed by other species. However, groundfish continues to play a significant role in the province and some populations remain healthy. Because of the fishery's history and the low capital barriers to entry, the groundfish fishery is also one of few that small-scale, independent inshore operators are able to participate in.

¹⁶ Raphael Kaplinsky, "Globalisation and Unequalisation: What Can Be Learned from Value Chain Analysis," *The Journal of Development Studies* 37, no. 2 (December 2000).

¹⁷ Eyjolfur Gudmundsson, Frank Asche, and Max Nielsen, *Revenue Distribution Through the Seafood Value Chain*, FAO Fisheries Circular (Rome: Food and Agriculture Organization of The United Nations, 2006).

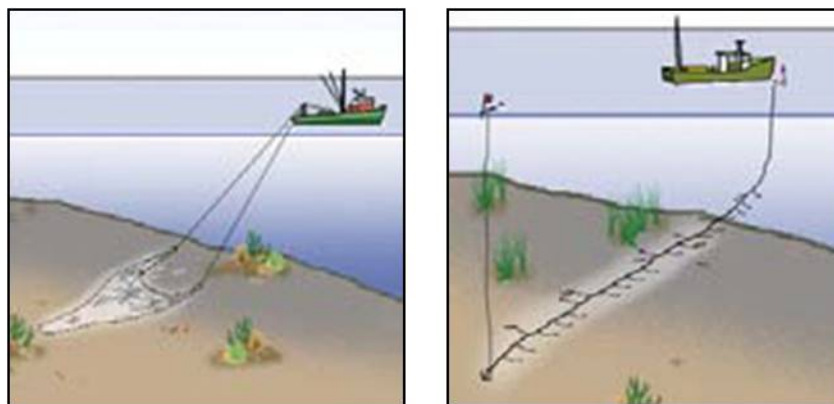
¹⁸ *Ibid.*

Groundfish Gear Types

There are essentially two types of methods commonly used by commercial vessels to catch groundfish in the Maritimes: either with a net or a hook. The net fishery uses larger boats to drag a large net over the ocean floor. The net is weighted along the lower edge, and is held open by large steel plates. This type of fishing is called 'dragging' or 'trawling' and the most common gear type is called an Otter Trawl (Figure 1a).

The alternative to this mobile gear type is a bottom longline (Figure 1b) which involves catching fish using a hook and line. This is a stationary (fixed) gear type that has minimum impact on the ocean floor because nothing is dragged across it. With a bottom longline, a series of baited hooks is laid across the ocean floor and anchored at both ends. The line is left in place for several hours, after which time it is retrieved and fish are removed from the hooks one at a time.

Figure 2: Two most common methods of harvesting groundfish in Maritimes: Otter Trawl (left) and Bottom Longline (right)



Bottom trawling impacts the bottom (benthic) habitat and threatens fish populations because it physically alters the benthic environment as the trawl is being dragged over the ocean floor.¹⁹ This can destroy rock formations and the slow-growing corals and sponges that other species depend on for habitat. Because of the disturbance of the ocean floor, bottom long lining is far more benign than bottom trawling in terms of its environmental impact. In fact, out of all of the commercial fishing methods used in Canada, bottom trawling ranks the highest in terms of ecological impact.²⁰

A 2011 study of relative habitat impacts of different gear types in New England showed that bottom trawling had just over 3 times the environmental impact than did bottom longlining.²¹ The disturbance of the benthic environment by trawlers has a direct impact on the long term population health and recovery potential of ground fish species such as cod, and in 2010, Nova Scotia trawlers landed 3.45

¹⁹ Fisheries and Oceans Canada, Impacts of Trawl Gears and Scallop Dredges on Benthic Habitats, Populations and Communities, Canadian Science Advisory Secretariat, June 2006.

²⁰ Susanna Fuller et al., *How We Fish Matters: Addressing the Ecological Impacts of Canadian Fishing Gear* (Ecology Action Centre, Living Oceans Society, and Marine Conservation Biology Institute, 2008).

²¹ M. Bachman, pers. comm.

times the amount of cod and haddock than did bottom long liners.²² The widespread use of bottom trawlers in the Maritimes threatens the long term sustainability of fish stocks.

The bottom trawl sector of the fishery is characterized by a high degree of capitalization and consolidation, with vessels increasingly being owned and operated by vertically integrated companies, in some cases with international processing and distribution operations. Meanwhile, bottom longline boats are owned and operated by independent fishermen. Because it costs more to catch groundfish in a sustainable way, owner-operator bottom hook and line boats operate with a much smaller economic margin than larger industrial operations. However, despite the high quality of the catch, they are often still offered the same price as dragger-caught fish at the wharf. These economic problems have made it difficult for the bottom longline fishery for many groundfish species to survive and participate in the dominant, conventional seafood market.

Figure 3: Haddock being harvested by a bottom longline fisherman. Photo Credit: Off the Hook CSF



Figure 4: Bruised and battered groundfish being hauled aboard a trawler. Photo Credit: Ecology Action Centre



3.1.1 Groundfish Harvesting / Production

Licensing and Quota

A wide variety of vessel sizes, ranging from small inshore fixed gear vessels to large offshore trawlers, participate in Nova Scotia's groundfish fisheries. Vessels are licensed according to one of three size classifications and their gear type: fixed gear is 'fixed' in place for a period of time, as bottom longlines are, while mobile gear, like trawlers, move around to catch fish. While there are over 3000 licenses issued, only one third of the total licenses are considered active. The majority of inactive vessels come from the small longline groups.

²² Based on Fisheries and Oceans Canada, Policy and Economics, "Fishery Landings Report", 2010.

Table 2 lists the number of eligible licences versus the number of active licences (defined as those with recorded landings) by fleet for the Scotia-Fundy Sector in the 1999/2000 fishing year (including three management areas – Eastern Nova Scotia, Southwestern Nova Scotia and Southwestern New Brunswick)

Table 2: Groundfish Licenses in Scotia-Fundy Region

Scotia/Fundy Groundfish fleet	# of Licenses	# Active	% Active
Fixed Gear <45'	2764	883	32%
Fixed Gear 45'-65'	62	20	32%
Fixed Gear 65-100'	13	11	85%
Mobile Gear <65'	422	131	31%
Mobile Gear 65'-100'	2	2	100%
Mobile Gear >100'	43	33	77%
Total	3306	1080	

Source: Fisheries and Oceans Canada, Maritime Region, "Groundfish: Integrated Fisheries Management Plan," 2003.

Vessel licenses may be inactive because low prices make it unprofitable to fish, quota is unavailable, or because an individual is retired/retiring. Licensing allows a person to participate in the fishery, but it is also necessary to acquire quota to land individual species. Nova Scotia groundfish quotas are allocated by fleet association, and then individually managed through an internal management system that can include different types of quota allocation systems.

Quotas to land a fixed amount of fish in a season can be bought and sold between individuals and between fishing associations. Quota in the groundfish sector is technically divided between fleets through a 'fleet separation' policy. This policy means that trawlers are not allowed to fish longline quota and vice-versa. An 'owner-operator' policy also prevents vertically integrated processing companies from formally owning quota, though complicated leasing arrangements are permitted.

In practice, it is possible for larger trawling companies purchase quota from longliners who are retiring or unable to get high enough prices to make a living. The trawling fleet may hold onto the quota and leave it unfished, and then lobby for it to be reallocated to the trawl fleet since it is just being 'wasted' anyways. This allows the spirit of regulations designed to support inshore fishermen to be overcome, though it is a more cumbersome process than simply 'buying out' existing operations.

Landings and Landed Value

While quota transference has led to a gradual steady decline in landings from smaller fixed gear vessels, there is still an active fixed gear fishery in existence. Around 20% of groundfish landed in 2010 were from the bottom longline fleet. For some species, such as cod and halibut, bottom longline landings actually count for a higher percentage of total catch than trawler landings do.

Table 3: Landings in kilograms by gear type, Nova Scotia 2010

	Bottom Longline	Otter Trawl	Gill Net	Handline	Total
Cod	1,759,477.87	1,568,915.79	325,777.43	19,281.45	3,673,452.54
Haddock	3,491,602.64	16,549,820.33	7,396.61	653.10	20,049,472.68
White Hake	619,866.99	451,628.81	423,433.65	-	1,494,929.45
Silver Hake	11.34	8,269,719.75	-	-	8,269,731.09
Red Hake	2,310.17	171,789.77	22.45	-	174,122.39
Turbot	10,190.03	52,114.99	-	-	62,305.02
Dogfish	5,203.67	536.61	-	-	5,740.28
Unspecified	34.57	2,141.85	-	-	2,176.42
Halibut	1,309,469.98	231,740.10	86,458.92	915.64	1,628,584.64
Total	7,198,167.26	27,298,408.00	843,089.06	20,850.19	35,360,514.51
% of total	20.36%	77.20%	2.38%	0.06%	

Source: Fisheries and Oceans Canada, Policy and Economics, Commercial Data Division, 2012

The table above, which was derived from landings data reported by fishermen to Fisheries and Oceans Canada, shows that a total of 35 million tons of groundfish (including cod, haddock, hake, turbot, dogfish and halibut) was caught in 2010 in Nova Scotia. Haddock is the largest volume of catch, followed by species of hake, and cod. Halibut tends to be caught more by bottom longline gear in part because halibut tends to be present in areas that can be targeted by longliners but may result in damage or losses of trawl gear (i.e. along the edges and holes in underwater banks).

The table below shows the value of different species, sorted by gear type. It is important to note that the source of this data is logbook reporting by fishermen to Fisheries and Oceans Canada. While this is the most complete source of data that shows production value to fishermen, as distinguished from value of export or trade, this data source should be considered incomplete and prone to errors. It is not uncommon, for example, for a logbook to report three different species caught and only show a landed value for one of them, which is likely to actually be the total for all three. This creates some artefacts in the datasets of inflated values for some species and null values for others. It is not possible to entirely correct for these errors.

Figure 5: A bottom longline fisherman poses with halibut.
Photo Credit: Off the Hook CSF



Table 4: Ex-vessel value of landings by gear type, Nova Scotia 2010

	Bottom Longline	Otter Trawl	Gill Net	Handline	Total
Cod	\$3,757,402	\$3,461,943	\$680,233	\$41,882	\$7,941,462
Haddock	\$1,346,521	\$9,764,228	\$3,282	\$548	\$11,114,580
White Hake	\$733,652	\$522,341	\$505,958	-	\$1,761,953
Silver Hake	\$7	\$5,840,122	-	-	\$5,840,130
Red Hake	\$2,290	\$170,414	-	-	\$172,704
Turbot	\$24,163	\$80,256	-	-	\$104,420
Dogfish	\$2,003	\$206	-	-	\$2,209
Unspecified	\$0	\$31	-	-	\$31
Halibut	\$4,348,932	\$204,997	\$33,908	\$90	\$4,587,928
Total	\$10,168,936	\$14,204,419	\$1,223,383	\$42,521	\$25,639,262
%	40%	55%	5%		

Source: Fisheries and Oceans Canada, Policy and Economics, Commercial Data Division, 2012

The chart shows that the landed value of each species is roughly what would be expected based on landed volume and a relatively consistent pricing across different gear types. This consistent pricing means that, despite the potential higher value for bottom longline fish based on quality and consumer demand for sustainable seafood, the 'ex-vessel' price paid to fishermen generally does not distinguish between gear types. While there is revenue being generated by the longline fleet, the value is spilt between many more boats, each with less quota than vessel in the trawl sector. There is a missed opportunity for longline fishermen to secure higher prices for their fish.

How Prices are Set

Most seafood pricing in Nova Scotia is based on prices that are set at different auctions in New England, which publish daily reports of what has been bought and sold for different fish species, categorized according to standardized size definitions. For example, haddock may be classified as large, market or scrod. Some auctions operate without buyers being able to inspect each catch, but at 'display auctions', quality can significantly influence prices that are offered within each species/size category.

Averages of some selections of the various auctions will allow the identification of a previous day's 'Boston price' for a particular species/size category. Some services also track the minimum and maximum prices that were paid on a particular day.

Much of Nova Scotia's seafood will end up at New England fish auctions after passing through distributors, but the Boston prices influence even those fish that go elsewhere. The auctions establish a regional baseline price that many Nova Scotia fish buyers consult regularly and use as the starting point for the prices they offer to fishermen. Additional costs of transportation, insurance, and most importantly, currency exchange are then factored in. Some consideration may also be given to quality / gear type.

Auction prices are based on the perceived quality of fish landed daily at each market, regardless of gear type. Therefore, the price offered to a hook and line fishermen in Cape Breton on any given day may be

determined by the quality of fish harvested by a dragger off the coast of Boston. This means that prices can vary widely, and often unpredictably. In order to have an idea of an expected price at a Nova Scotia wharf, one would have to speculate not about local supply and demand, but about supply and demand in another country.

Table 5: Actual prices per pound for three sample longline trips in Nova Scotia of three groundfish species (various size categories for each species)

Species	March 2010 Price	May 2010 Price	September 2011 Price
Cod ('market' weight)	\$2.20	\$1.40	\$1.40
Cod (large)	\$1.40	\$1.65	
Cod (small)	\$1.00	\$0.75	
Haddock ('market' weight)	\$1.55	\$1.45	
Haddock (small)	\$1.10		\$1.30
Hake ('market' weight)	\$1.20	\$0.65	
Hake (large)	\$1.00	\$1.40	\$0.65
Hake (small)	\$0.75	\$1.00	

Source: Personal Communication with B. Gillis, commercial fisherman

For fish buyers, the existence of an integrated market for seafood provides transparency in pricing and some assurances of price stability. However, it also means that the prices offered to Nova Scotia fishermen are determined by seafood buyers in Boston and may not represent the quality of a given catch. This type of pricing is typical of commodity products; for example, global prices of soybean products are primarily determined by the Chicago Board of Trade futures exchanges, and cotton futures are traded on the ICE Futures U.S. Exchange.

The commodification of Nova Scotia seafood has allowed participation in global markets at the cost of being able to effectively brand or add marketing value to products. Aggregated supplies of products are effectively shipped long distances, but **fishermen, fish buyers and processors have become 'price-takers' who respond to Boston prices that may not reflect the actual operating costs in Nova Scotia or the potential to receive more for higher value products.** Of particular concern is the fact that while Boston prices do reflect quality to a certain extent, they do not distinguish different gear types or environmental impacts. This means that there is usually no differentiation by the buyers between gear types (although market efforts like Off the Hook CSF are beginning to change this – see below).

Vertically integrated firms also limit competition and the ability of small scale fishermen to secure fair prices for their catch. Many of the larger buyers/processors also own their own vessels. They buy fish from independent fishermen only to maximize the operating efficiency of their processing plants, and often do not differentiate between gear types when setting their price.

Quality and Price Ranges

Randomly surveying cod and haddock prices from 20 days at New England fish auctions in 2011 and 2012 allows a comparison to be made between high and low prices for different lots of fish. These

ranges show the potential premium that can be secured for higher quality production. These premiums should reflect the minimum that could be obtained for high-quality, properly marketed, traceable and sustainable seafood. This product would have added value from the traceability and sustainability characteristics, and so potential premiums should be higher in practice.

This data is based on the 'market' size categories that make up the bulk of fish sold. While this data is informative, it is important to note that prices of individual lots are not available, and volumes of sales are not considered in average prices.

This sample shows that the average price paid at auction for cod was \$248.35/cwt and for haddock was slightly higher at \$283.05/cwt. More interestingly, our analysis shows a significant range of minimum and maximum prices paid for both species. The lowest price paid for cod was \$125/cwt and the highest was \$492/cwt – 294% higher. For haddock, prices range from \$199/cwt to \$605/cwt, which is 205% higher. Same day price differences for cod ranged from 5% to 103%, and for haddock they ranged from 3% to 65%. For both species, however, the average difference between low and high prices was similar: 21% for cod and 23% for haddock, with medians of 15% and 16%, respectively.²³

²³ Data independently collected through personal communication from the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD. Available at <http://www.st.nmfs.noaa.gov/st1/index.html>

Table 6: Price ranges paid for groundfish at New England Fish Auctions, in \$ / hundredweight

Cod			Haddock		
Minimum	Maximum	Difference	Minimum	Maximum	Difference
229	295	29%	203	209	3%
302	318	5%	232	247	6%
277	377	36%	367	607	65%
220	245	11%	278	403	45%
399	492	23%	278	315	13%
256	324	27%	378	539	43%
260	275	6%	269	301	12%
200	210	5%	224	259	16%
263	321	22%	235	281	20%
153	310	103%	226	294	30%
221	241	9%	278	322	16%
191	208	9%	227	268	18%
237	271	14%	258	296	15%
276	292	6%	210	272	30%
193	208	8%	199	230	16%
158	184	16%	230	255	11%
158	209	32%	257	284	11%
182	205	13%	212	339	60%
228	268	18%	199	252	27%
125	153	22%	277	312	13%
Average Price Range		21%	Average Price Range		23%
Lowest Recorded Price		125	Lowest Recorded Price		199
Highest Recorded Price		492	Highest Recorded Price		607

Source: National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD. Available at

<http://www.st.nmfs.noaa.gov/st1/index.html>

These price ranges show that – even in large-scale commodity markets – there is an opportunity to distinguish a high quality product with added-value intangibles. The average price premium of 21-23% can be a very promising incentive that makes a meaningful operational difference.

Employment

In addition to potentially being able to secure higher prices for fish and increase the value of fishery resources, the longline groundfish fleet has the potential to increase employment in the industry significantly. **The chart below shows that every mT of haddock harvested can generate either 2.8 working days on a longline vessel or 0.85 working days on a trawler.**

This chart was generate using haddock landings data, which showed that in 2010 there was a total of 1325 commercial fishing trips that used bottom longline gear and 1486 trips using trawl gear, at an average trip length of 2.54 days and 3.15 days, respectively. An average of 2.91 crew members were employed on each bottom longline trip and 3.00 were on each trawl trip. Based on these numbers, it is possible to calculate the total days at sea for each gear type and multiply by the average number of

crew members on each trip to derive a total number of ‘working days’: 9793.60 in the bottom longline fleets and 14942.70 in the trawl fleets. Accounting for the amount of fish shows the employment generated per mT of the fishery resource.

Table 7: Employment rates per fish consumption by gear type

Gear Type	Fish Consumption (kg)	Total Days at Sea	Average Number of Crew	Total Working Days	Working Days / mT
Longline	3,491,602.64	3365.50	2.91	9793.60	2.80490108
Otter Trawl	16,549,820.33	4680.90	3.00	14042.70	0.848510722

Source: Independently calculated based on Fisheries and Oceans Canada, Statistical Services, 2012

It is not surprising that the larger-scale, more capital-intensive fishing operations employ fewer people per kilogram harvested than smaller vessels. The industry push towards quota consolidation and fleet ‘rationalization’ is based on their ability to operate with higher volumes and lower margins – in part achieved by employing fewer people. It is important to keep in mind that different fleets are assigned their quota – the privilege to harvest a certain volume of fish – by government. The demonstration that every haddock harvested by bottom longline gear generates 3.3 times more employment hours than with trawl gear should not be interpreted as a way to reduce harvesting costs in the industry, but as a consideration for government when deciding how to allocate a public resource.

The high capital costs of operation in the trawl fishery mean that labour reduction has not translated into wage increases. Some of these savings are consumed by vessel, fuel and quota costs. **Ultimately, supporting the bottom longline sector of the industry can result in more people being employed catching the same number of fish, both an environmental and social gain.** In order to provide a living wage in this sector, the value of the catch can be increased by accessing the market’s demand for meaningfully sustainable seafood the empowers and supports small-scale producers.

3.1.2 Groundfish Processing and Distribution²⁴

Processing

The Nova Scotia fish processing sector consists of just over 220 licensed enterprises of varying types (processors, shippers and buyers), with 182 in operation in 2006. This is down by about half since the 1980s. Plants range in size from under five to several hundred employees. They are concentrated in southwest Nova Scotia and Cape Breton, with a handful of others along the eastern shore and Northumberland Strait.²⁵

²⁴ Much of the information this section is based on is found in the comprehensive Gardner Pinfold and Rogers Consulting Inc. (2007) Report: “Nova Scotia Seafood Processing Sector: State of the Industry and Competitiveness Assessment.”

²⁵ Gardner Pinfold and Rogers Consulting Inc. (2007), “Nova Scotia Seafood Processing Sector: State of the Industry and Competitiveness Assessment.”

There are 181 licensed groundfish processing plants in Nova Scotia (issued to 161 enterprises), but only 42 plants are active and identify groundfish as their major business²⁶. The groundfish processing sector in Nova Scotia faces significant challenges caused by overcapacity in the industry that built up prior to the collapse of groundfish stocks in the early 1990s. Entry into the groundfish processing sector is restricted by a licensing moratorium that was put in place to limit new entrants and increase the value of investments made by existing participants, who are concerned about adding new actors in the struggle to secure raw material. This policy, designed to support investment in the processing sector, also makes it difficult to establish new enterprises designed to help fishermen add value to their own product.

We attempted to survey approximately 50+ processors and distributors for this report. However, we were only able to secure meaningful responses from those processors we had existing relationships with. One lesson learned is that there is very little immediate interest in sharing information with other groups and actors.

Figure 6: Cod being filleted at a Nova Scotian groundfish processing plant. Photo Credit: Ecology Action Centre

The availability, price and quality of raw materials are the most significant challenges facing Nova Scotian fish processors today. Industry overcapacity and declining stocks result in strong competition for unprocessed fish and difficulty for some plants maintaining levels of activity sufficient to justify capital investments. This contributes to the labour intensive production seen in Nova Scotia, which results in higher relative processing costs than in other countries. Groundfish processors tend to operate on a day-to-day basis, negotiating seasonal supply arrangements when able and adapting to supply disruptions when possible. This leaves comparatively little time to invest in market and product development; all decisions are essentially based on supply considerations.



Importers and distributors exert significant market power over processors, who are often hampered by a need for immediate sales to ensure cash flow. Processors often attempt to develop supply security through informal arrangements such as the provision of ice, bait and financing to individual fishermen, as well as by filing employment insurance and tax forms. Some processors are also able to purchase quota through trust agreements, though fish processing plants are not able to acquire commercial fishing licences in inshore fisheries (for vessels <65'). While advantageous to processors, these informal arrangements reduce fishermen's ability and willingness to control their product once it is landed.

The geography of Nova Scotia limits competition. Since fishing ports and fish plants (buyers) are so spread out, there is a limited opportunity for fishermen to "shop around" to get the best price for their catch. A fisherman does not want to invest the time or the money to call around to find the best price,

²⁶ Ibid.

and then take the time to drive their catch to distant buyers. Buyers do not have the infrastructure to offer a pick-up service. The result is limited competition in any given area, with the fishermen generally beholden to their buyers to buy their fish, and to take any price they are given.

Fishermen often enter into informal relationships with buyers which leave them in some way indebted, limiting their ability to sell to other buyers. These relationships often include an agreement that if a boat remains loyal to a buyer they will receive free ice, access to bait, tote boxes, freezer space, or even small loans for equipment repairs or purchases. Once entered into this sort of arrangement, fishermen are often reluctant to switch buyers even if they are offered a slightly higher price per pound, fearing the long-term results of severing the relationship.

Vertically integrated companies that exert control from ocean to customers are able to rely on their own vessels to provide all or much of their raw materials. These companies are better able to access financing, specify delivery patterns, establish long-term marketing arrangements and advocate for policies that benefit their operations. While this vertical integration is conventionally a sound practice, it is important to note that its success in overcoming supply uncertainty is directly linked to its ability to reduce competition for prices paid to fishermen and the transformation of fishery owner-operators into employees of processing companies. Concentration of power at any level of the value chain will necessarily reduce power (and therefore value) in others.

Distribution and export sector

Canadian fisheries have historically been export-oriented, and fisheries are one of Nova Scotia's primary sources of export earnings. For all of Canada, trade figures show that Canada's exports of fish and seafood products reached \$3.9 billion in 2008.²⁷ More than half of Canadian fish and seafood exports are to the United States. The value of exports to the United States was over \$2.4 billion in 2008, representing 328,000 tonnes of fish and seafood products.²⁸

The European Union is a significant market, importing \$489 million worth (about 14 per cent) of Canada's fish and seafood products, followed by Japan (\$294 million) and China (\$259 million) in 2008.²⁹

Nova Scotia is Canada's second leading exporter of fish and seafood products after British Columbia, with a total value of \$846.5 million in 2008, which represented 118,928 tonnes (t) of fish and seafood. Nova Scotia's most valuable export species are lobster (21,897 t valued at \$352 million), scallops (5,843 t valued at \$95.1 million), and crab (8,374 t valued at \$78.9 million).

Despite issues in the industry, groundfish products still generate substantial export revenues. The U.S. is the leading market, taking just over 70% of total groundfish exports.³⁰ In 2011, exports of groundfish and groundfish products were valued at \$84 million (including cod, haddock, dogfish, hake and halibut

²⁷ Government of Canada, "Provincial Breakdown of Canadian Fish and Seafood Exports in 2008."

²⁸ Ibid.

²⁹ Ibid.

³⁰ Gardner Pinfold and Rogers Consulting Inc., "Nova Scotia Seafood Processing Sector: State of the Industry and Competitiveness Assessment."

products).³¹ Cod, haddock and halibut each generate approximately \$20-25 million in export revenue with hake producing just under \$15 million. Cod produces the most value per volume of product, largely due to the high value of salted and dried cod products.³²

There are a range of different types of companies involved in the distribution, wholesale and export of groundfish. Some distributors act as fish buyers and resellers, and provide the requisite transportation, insurance and ‘cold-chain’ needed to bring products to other buyers. Other distributors are also processors and some vertically integrated companies own and operate their own fishing, processing, distributing and wholesale activities.

There are approximately 60 distributors listed in Nova Scotia’s seafood directory that identify groundfish as a major part of their product lines. Some focus mainly on a single species, most often halibut, while others sell a wide range of products.

Table 8: Groundfish Distributors in Nova Scotia

A. C. Covert Limited	Cape Breeze Seafoods Limited	Leo Atkinson Fisheries Ltd.
Abriel Fisheries Limited	Coastal Fog Fisheries	Pearlmark Foods Inc.
Adams Fisheries Limited	Coggins Global Trading Inc.	Pleasant Bay Fish Co. Ltd.
AJY Fisheries Ltd.	Comeau’s Seafoods Limited	Premium Seafoods Limited
Anderson Cove Seafoods Ltd.	D. B. Kenney Fisheries Ltd.	R. Royle & Co. Limited
Atlantic Bay Fisheries Ltd.	Davis Strait Fisheries Limited	RBN Fisheries Limited
Atlantic Pearl Seafood Limited	Emery Smith Fisheries Limited	Rio Import & Export Ltd.
Bakers Point Fisheries Limited	F. Thibault Seafoods	Sea Merchant Inc.
Birch Street Seafoods Ltd.	Fisher King Seafoods Ltd.	Sea Star Seafoods Limited
Blue Wave Seafoods Inc.	H&H Fisheries Limited	Shag Harbour Fisheries Limited
Bluenose Seafood Inc.	High Liner Foods Incorporated	True North Fisheries Ltd.
BMC Seafood Ltd.	Hopkins & Devine Fisheries	True World Foods of Canada
Breakers Fish Co.	I. C. Fish Smokers	Twin Seafood Limited
Casey Fisheries Limited	Little Island Fisheries Ltd.	West Fish Canada Ltd.
Ceilidh Fishermen’s Cooperative Ltd.	M & F Fisheries Ltd.	Xsealent Seafood Company
Charles & Robert Blades Ltd.	Merex Inc.	Yarmouth Bar Fisheries Limited
Chezzetcook Fisheries	Mime’j Seafoods Limited	Zeus Seafood Inc.
Clare Fisheries Limited	N. LeBlanc Enterprises Limited	
Clearwater Seafoods Limited Partnership	I. Deveau Fisheries Ltd.	

Source: Atlantic Canada Exports Directory

³¹ Fisheries and Oceans Canada, Statistical Services, 2012

³² Fisheries and Oceans Canada, Statistical Services, 2012

None of the distributors surveyed had a mechanism in place to ensure the traceability of groundfish gear type, with the exception of companies offering high-quality salt cod products (which exclusively purchase longline-caught fish). Most distributors identify quality as an important product attribute but do not associate high quality with a certain gear type. Proper handling of fish after catch is crucial, but the comparatively gentle treatment that longline-caught fish receive provides an opportunity to deliver the highest quality products. Training for small-scale operators in best practices in post-harvest handling may help further increase product quality in this sector.

With the exception of salted and dried cod, the vast majority of Nova Scotia groundfish exports are in the form of fresh, whole dressed fish (gutted and scaled, but not filleted). Processing, whether filleting or salting, drying, curing, etc, adds significant value to the product. As with other

Figure 7: Packaging salt cod, one of Nova Scotia’s most valuable seafood exports. Photo Credit: Ecology Action Centre



seafood products, the bulk of all exports travel to the United States, with the European Union being an important secondary market. With growing competition from Chinese frozen products, Nova Scotia processors are exporting more to the U.S. in fresh form.³³

³³ Gardner Pinfold and Rogers Consulting Inc., “Nova Scotia Seafood Processing Sector: State of the Industry and Competitiveness Assessment.”

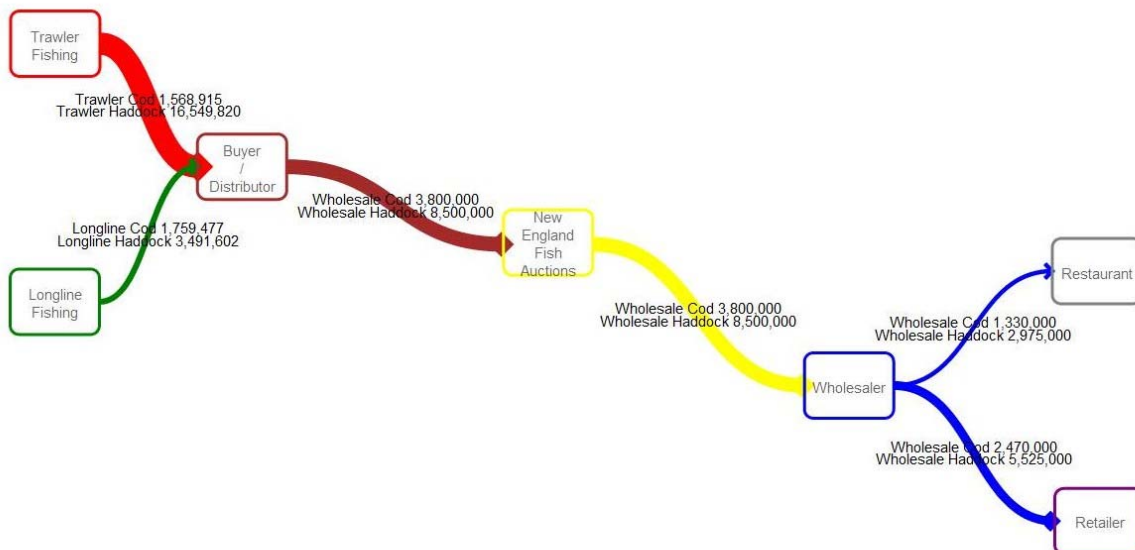
Table 9: Nova Scotia groundfish exports by product type

Species	Product	2011		
		Quantity (kg)	Value (\$)	Value / kg
Cod	Fish, pickled/cured	25,000	\$159,360	\$6.37
	Fish, salted and/or dried	2,362,101	\$21,101,788	\$8.93
	Fish oil			
	Seafish fillets, fresh	113,387	\$988,428	\$8.72
	Seafish fillets, frozen	30,586	\$156,526	\$5.12
	Seafish, whole/dressed/fresh	557,548	\$1,819,648	\$3.26
	Seafish blocks, frozen			
	Seafish, whole/dressed/frozen	9,983	\$38,598	\$3.87
	Cod total	3,098,605	\$24,264,348	\$7.83
Hake	Fish, salted and/or dried	301,789	\$1,517,145	\$5.03
	Seafish, whole/dressed/fresh	6,575,216	\$12,830,240	\$1.95
	Seafish, whole/dressed/frozen	133,772	\$178,917	\$1.34
	Hake total	7,010,777	\$14,526,302	\$2.07
Haddock	Seafish blocks, frozen			
	Seafish fillets, fresh	406,954	\$3,738,296	\$9.19
	Seafish fillets, frozen	152,867	\$1,040,859	\$6.81
	Fish, salted and/or dried	152,309	\$743,932	\$4.88
	Seafish, whole / dressed / fresh	6,291,032	\$16,958,974	\$2.70
	Seafish, whole / dressed / frozen	10,237	\$22,236	\$2.17
	Haddock total	7,013,399	\$22,504,297	\$3.21
Halibut, Atlantic	Seafish, whole / dressed / fresh	1,363,369	\$21,545,186	\$15.80
	Seafish, whole / dressed / frozen	3,088	\$46,859	\$15.17
	Halibut, Atlantic total	1,366,457	\$21,592,045	\$15.80
Total		18,489,238	\$82,886,992	\$4.48

Source: Fisheries and Oceans Canada, Statistical Services, 2012

Figure 8 below shows a simplified value chain diagram for Nova Scotian groundfish exports to the United States. Quantities are in kilograms, derived from landings and export data and fillet exports have been converted into equivalent dressed weights. Since the majority of exports to the United States are in the form of fresh whole fish and fresh fillets, there are relatively few chain actors compared to, for example, supply chains of processed agricultural goods. In this chain, fish is typically sold from boats to buyer/distributor/processors; in large operations, these boats and buyer/processors may be owned by the same company. Distributors export to the United States through New England fish auction markets or directly to American wholesalers. Wholesalers then supply to restaurants and retailers.

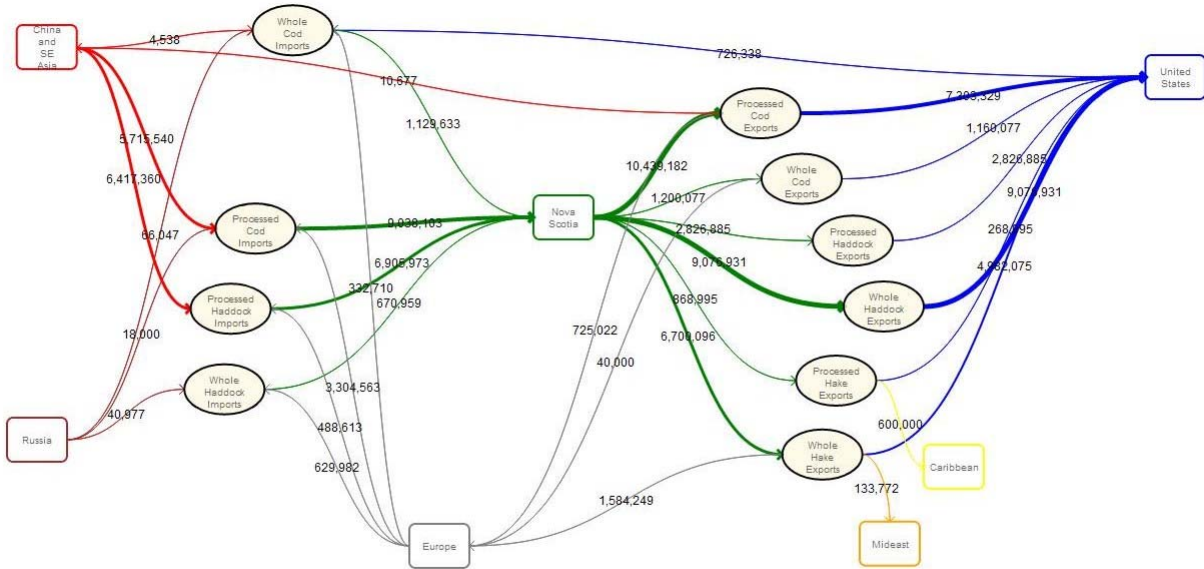
Figure 8: Simplified Value Chain – Nova Scotia exports to the United States



Source: Produced using data from Fisheries and Oceans Canada, Policy and Economics, Commercial Data Division, 2012 and Fisheries and Oceans Canada, Statistical Services, 2012

Figure 9 below shows all Nova Scotian imports and exports of whole and processed haddock, cod and hake along with their destination / origin countries. Values are in kilograms, and have been converted to approximate dressed weight equivalents, i.e. the weight of fillet imports and exports has been multiplied based on generic yield calculations. The figure gives a visual demonstration of the import and export patterns of Nova Scotia groundfish: the majority of exports are to the United States and Europe, and a significant amount of processed cod and haddock is imported, primarily from China.

Figure 9: Nova Scotia's trade balance – imports and exports of groundfish products (in fresh weigh equivalents)



Source: Produced using data from Fisheries and Oceans Canada, Policy and Economics, Commercial Data Division, 2012 and Fisheries and Oceans Canada, Statistical Services, 2012

The business model for producing large volumes of groundfish that was explored in the previous section of the report has significant impacts on other chain actors. The ‘economically efficient’ gear types used to harvest groundfish has contributed to the decline of Nova Scotia’s processing sector by lowering the value of the fish. As processing costs in Nova Scotia have increased relative to the value of the raw material, it has become more economical to process fish outside of the province. This maximization of profits at the individual level actually has a negative impact at the provincial level, as opportunities to add value to products and increase the value of the fishery are lost.

Cod is the only species that Nova Scotia exports primarily in its most valuable form with approximately 75% of the total weight of cod exports being salted and/or dried products worth an average of \$8.93/kg. The majority of the remainder is whole, dressed fresh fish, worth only \$3.26/kg. However, there is an unknown weight loss in the processing process; a significant portion of 1 kg of whole fish is lost when processing, though ‘waste’ can be sold as a by-product in some cases (i.e. as feed or for compost and fertilizer).

Over 90% of hake products are sold in whole, dressed fresh form, which is only worth \$1.95/kg at average export prices. Value added processing can increase the unit price to \$5.03/kg, but less than 5% of Nova Scotian hake is processed in the province. Most is exported whole to the United States.

Haddock exports represent the most significant loss of value in groundfish species, as only 5.7% of exported weight is in the most valuable form, fresh fillets. Over 6 million kg of whole dressed haddock was exported from Nova Scotia in 2011, worth only \$2.70/kg or a total of \$16,958,974. If that fish had been processed in Nova Scotia, it would have instead generated \$24,282,125.3 worth of fresh haddock

fillets (assuming a standard 35% yield from dressed fish). By failing to process this fish in the province, Nova Scotia lost over \$7 million in export revenue in 2011, as well as the associated economic activity that would be generated by employment in the processing sector. Nova Scotia has excess processing capacity that could handle these products; the challenge is in finding volume, quality and price combinations that make domestic processing more attractive than shipping products globally and losing traceability and place-based branding opportunities.

Table 10 shows the net GDP impact of this export of unprocessed haddock over the past four years, assuming a fillet yield of approximately 40% of dressed weight and deriving an average unit value from actual exports in the same year. **It shows that dressed haddock exports could have consistently generated between \$5 and \$8 million more in export revenue had the same fish been processed in Nova Scotia and then exported.**

Table 10: Unprocessed haddock exports and equivalent fillet values

	2009			2010			2011		
	Quantity	Value	Unit Cost	Quantity	Value	Unit Cost	Quantity	Value	Unit Cost
Haddock Exports	10,330,536	27,728,668	\$2.68	9,069,931	\$22,487,828	\$2.48	6,291,032	\$16,958,974	\$2.70
Equivalent If Filleted	4,338,825	\$36,055,637	\$8.31	3,809,371	\$27,922,690	\$7.33	2,642,233	\$24,282,125	\$9.19
Net Impact		-\$8,326,969			-\$5,434,862			-\$7,323,151	

Source: Fisheries and Oceans Canada, Statistical Services, 2012

Redundant Import and Export Costs

Haddock is a popular seafood choice in Nova Scotia, and the export of unprocessed whole fish actually occurs concurrently with the import of processed fillets. Table 11 below shows the weight and value of imported haddock fillets compared to that of whole dressed exported fish. Filleted haddock includes fresh fillets, frozen fillets and frozen blocks of fillets. Haddock that has been processed further (i.e. salted, battered, etc) is excluded.

Table 11: Processed haddock imports compared with unprocessed exports

	2009		2010		2011	
	Quantity	Value	Quantity	Value	Quantity	Value
Filleted Haddock Imports	1,468,902	\$7,769,970	1,604,745	\$7,953,303	2,301,991	\$11,656,118
Whole Haddock Exports	10,330,536	\$27,728,668	9,076,951	\$22,511,739	6,301,269	\$16,981,210

Source: Fisheries and Oceans Canada, Statistical Services, 2012

The primary processing step of filleting adds value to the fish, and by exporting unfinished products and importing processed fillets and fish blocks, Nova Scotia has lost this value. The majority of this processed haddock is imported from China, and there is an environmental cost to this practice of shipping fresh

and frozen fish around the world to be returned as fillets. Economically, this means that processing jobs have been moved to other areas of the world and other countries are able to 'count' this value-added step towards their own GDP. **Over the past four years, the export of whole haddock and re-import of haddock fillets has directly cost Nova Scotia's GDP between \$7 and \$11 million each year, not accounting for economic impact of employment in processing.**

This practice of re-importation of seafood products is a symptom of the underlying problems posed by commodification of these products. Low profit margins have created a situation where industry actors handle enormous volumes of fish to the extent that transportation across the world in search of lower cost processing has actually become feasible. The reliance on this 'low value and high volume' –based business model is partly caused by the state of Nova Scotia's processing sector, which is considered 'uncompetitive' on a global scale. However this problem is also caused by the industry's export-orientation and its attempts to compete with other global food producers in a global commodity market rather than to localize the production of regional food products.

3.2 Value Chain Analysis

Our overview of these important Nova Scotia fisheries value chains shows some significant challenges if this sector is to contribute more substantially to a localized, regional food system in the long-term. The discussions above show some unfortunate trends in the development of this industry and the scale of consolidation and commodification of fishery operations and products.

- Seafood is becoming increasingly commodified and produced under a high-volume, low-margin production model, with few conventional opportunities to distinguish products.
- The fleets that can produce the highest volumes of fish are capital intensive, vertically integrated operations that employ minimum numbers of people and cause significant environmental damage through habitat destruction and by discarding less valuable or non-commercial species. These fleets are not only growing in 'market share' but also in ownership and control over government-issued quotas that allow fishermen to fish at all.
- Industry actors compete vigorously on price, and generally only on price. They are also unwilling to share information with other actors. This prevents cooperation towards shared marketing, traceability and sustainability, along with the development of regional markets, and product innovation.
- Overcapacity in the processing sector, falling global demand and exchange rate fluctuations have combined to consistently push ex-vessel prices (paid to fishers) lower and lower, while labour costs and uncompetitive domestic processing has led to the baffling practice of exporting local seafood for overseas processing and re-importation.
- Though some consumers are willing to pay more for sustainably harvested seafood, communicating about and labelling these products is challenging and complex. The problem is complicated by the misleading labelling of products that have been processed overseas as 'local' based on country of origin.

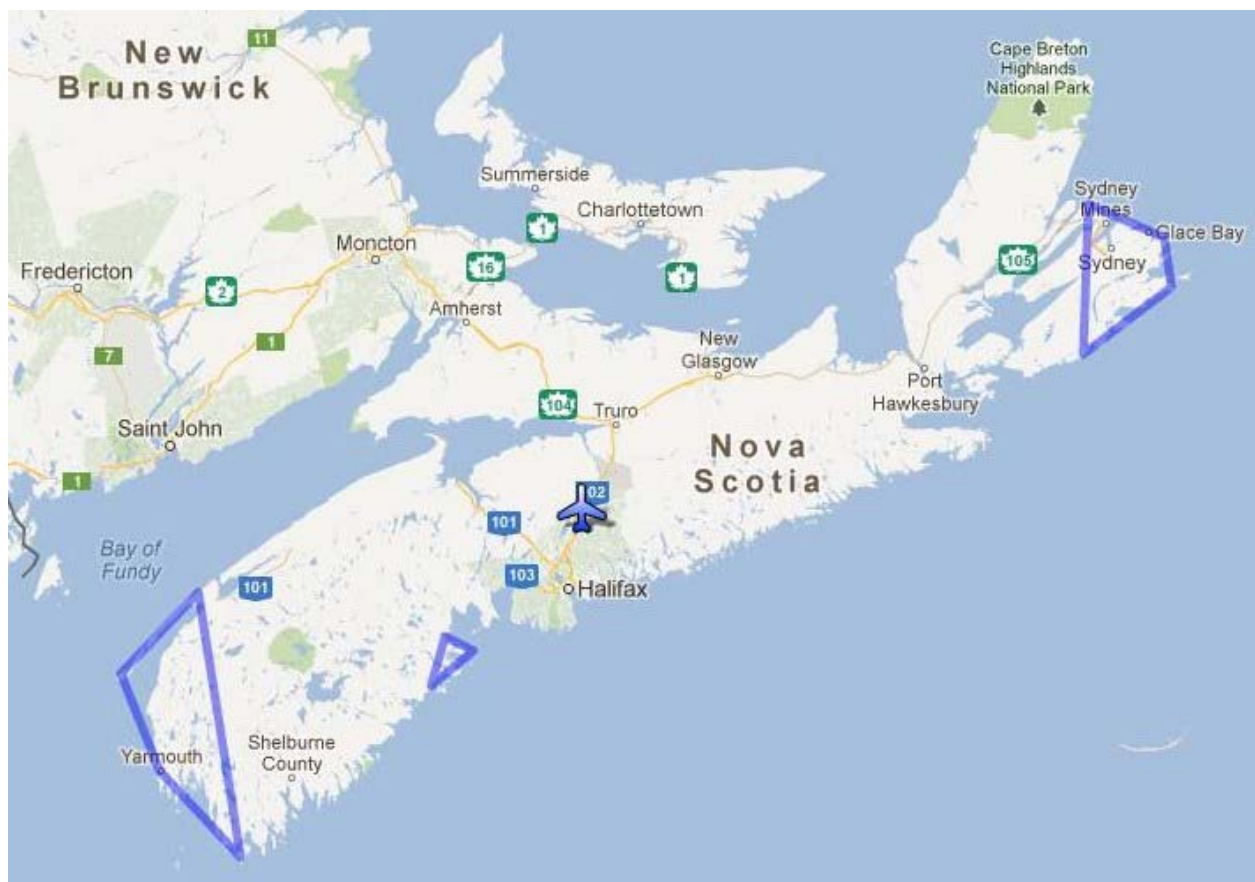
The next section of this report discusses the fundamental drivers of some of these challenges and some potential opportunities to mitigate and address them.

4. Discussion of Challenges

Geography

One of the most obvious challenges facing the Nova Scotia fishing industry is the geography of the province. While Nova Scotia's proximity to fishing grounds is a major boon, the geographic dispersion of fishing ports, processors and transportation hubs presents very real challenges. A significant amount of fishing activity takes place along the southwest coast of the province, in the Bay of Fundy, and throughout Cape Breton – far from the population centre of Halifax and the transportation hubs in the centre of the province.

Figure 10: Map of Nova Scotia - most fishing takes place in areas highlighted in blue, far from population centres and transport hubs



Nova Scotia itself is also far from the major centres of demand for seafood. This combination of geographic spread and distance from markets presents challenges in product transportation and aggregation. Since transportation costs are relatively high, it is more challenging to handle smaller shipments in a cost-effective way. Geographic spread creates a very real incentive for brokers and distributors to focus on high volume activities, which reduces the ability to a) transport smaller amount of food locally/regionally and b) segregate traceable lots of products from specific producers to distinguish them when they reach consumers (whether by gear type, fishing community, etc).

Information Flows

Related to the spread out geographic diversity of the province is the difficulty that fishers and processors have in establishing transparent systems to share information. Information exchange in supply chains can help:

- provide access to timely and accurate information;
- reduce transaction costs associated with finding prices and securing markets;
- decrease pricing volatility by reducing dependence on foreign fish auctions as a basis for domestic fish prices;
- provide a mechanism for buyers to access aggregated supply, and for sellers to access fair market value through exposure to market competition; and,
- improve inventory management on the consumer end by connecting buyers with an opportunity to purchase smaller quantities of fish at high frequency. Globally, 27 million mT of fish is lost each year due to spoilage.³⁴

There is currently a lack of information exchange between members of the seafood supply chain. Fishermen often do not find out what the exact value of their catch is until after they are paid for it. The buyers' price setting method for various species is fairly arbitrary, loosely based on prices at foreign fish markets. Processors and distributors base their prices on these foreign auction prices for raw materials (fish), and then factor in costs such as customs, bonds, insurance, NAFTA fees, taxes, licensing fees, packaging, transportation costs, packaging, and currency exchange. Meanwhile, wholesalers, retailers, and restaurants set their prices based on market competition, and are quick to source elsewhere if supply costs threaten their margin.

There are several models of fish auctions that have operated in recent years in New England and elsewhere. A traditional display auction, such as the Portland Display Auction and the Base New England Seafood display auction involve fishing boats offloading their catch directly at the auction site, and buyers ranging from retailers, restaurants, and wholesalers bidding on each batch of fish until they are all sold. Auctions generally operate on a slim margin, and rely on high volume.

Nova Scotia's small scale, sustainable fisheries are too spread out to support such an auction. There is no transportation infrastructure currently in place to aggregate the supply. The markets (including local, regional, national, and international) are equally fragmented, with each buyer and distributor seeking out arrangements with individual buyers in any market they can find. The result is a fisheries supply chain that is fragmented both on the supply side and on the demand side.

An electronic or 'virtual' fish auction could provide a simple mechanism to aggregate the supply of sustainable seafood, and create a marketplace in which to sell the products to key markets at competitive prices. A software based solution for information exchange between suppliers (fishermen) and buyers (processors, distributors, and ultimately wholesalers and retailers) would benefit each

³⁴ Cheryl Dahle, Changing the Future of Wild Fish: An Entrepreneurial Approach to Sustainable Solutions, Reimagining Complex Systems, Ashoka Changemakers (Discovery Group and Ashoka Initiative, 2009), raw data at <http://fof.centralstory.com/the-raw-data-interesting-fish-facts>

member of the supply chain. However, a virtual market would only be effective if it was supported by transportation infrastructure and guaranteed cold chains.

High volumes and low margins

The geography of the province and the historical export-orientation of Nova Scotia seafood – supported by favourable exchange rates that no longer exist – has led to the creation of an industry largely focused on production and distribution of high-volume, low value commodity products. For individual actors selling to an integrated global market, this situation is simply the result of individual choices that make sense: transportation costs are high, labour costs are high, production fluctuates and historic over-capitalization means that constant throughput is required for some operations.

This unfortunate economic truth highlights a major problem of this industry that underlies issues faced in different chains: the transactional model for production of high volume, low value commodity products. With a wide variety of actors working to underbid each other, the industry as a whole has suffered. Recreating an industry that supports a resilient, regional food system will require moving away from this model of individual actors working at cross purposes. The next section of the report discusses some strategies that might help us get to that point.

5. Value Chain Opportunities

There are several different complementary strategies that may help address some of the fundamental challenges to restructuring a regional seafood system. These approaches reveal some potential to rethink value chains that have been established and build on opportunities shown through this project and the Ecology Action Centre's other Marine Program activities. Ultimately, each approach seeks to incentivise sustainable fishing practices by enabling harvesters to become price setters, rather than price takers, and by connecting consumers with the realities of this food system.

5.1 Regional Direct Marketing

One option for increasing the value of Nova Scotia fisheries and the portion of that value that accrues to fishermen and Nova Scotia is by engaging more with the surge in demand for local food products. This stems from environmental and health concerns, along with a desire to invest directly in local communities. Most direct seafood sales happen via roadside peddling and delivery activities and some fishermen sell 100% of their catch directly. However, the actual volumes of fish sold in this manner are small and there is little active promotion of most fishermen's direct marketing activities.

Off the Hook Community Supported Fishery

In the spring of 2010, five bottom hook and line fishermen from the Digby Neck and Islands along the Bay of Fundy in Nova Scotia formed as Off the Hook Cooperative and joined with the Ecology Action Centre to launch Atlantic Canada's first Community Supported Fishery (CSF). Like other direct marketing enterprises, CSFs provide several benefits to small-scale fishermen, including more family income, more market choices, increased ownership and livelihood control. By securing payment at the start of the season, the fishermen are ensured a fair price for their catch, while subscribers enjoy a reliable source of local, sustainable fish.

Off the Hook fishermen use bottom longline gear with minimal contact with the sea floor, are engaged in research to further minimize the impact of their fishery on marine diversity and are exploring the use of groundfish traps to reduce fishing related mortality of species considered threatened or endangered.

In its first year, Off the Hook CSF had approximately 100 'subscribers' who signed up for weekly deliveries in Halifax. In 2011, the project was able to expand dramatically. Through partnerships with local processors, Off the Hook CSF was able to offer filleted fish, which was previously not possible due to regulations preventing fishermen from 'processing' their own products. In its second year, Off the Hook attracted almost 200 subscribers. In January 2012, Off the Hook CSF was selected as one of the top three 'Solutions for Coastal Fisheries' in a global competition organized by RARE Planet and National Geographic.

Figure 11: An Off the Hook CSF barbeque in Halifax.
Photo Credit: Off the Hook CSF



The number of fishermen and subscribers directly involved in Off the Hook is small, and the fishing members of the coop are not able to sell all – or even most – of their catch through Off the Hook CSF. The majority is still sold to buyers at the wharf. However, the financial impact of being able to divert a small portion of the catch to higher value markets is significant. For some members of the co-op, being able to sell fish through Off the Hook is what makes fishing a profitable enterprise.

Table 12 below shows a comparison of 'balance sheets' showing one days fishing that was sold to Off the Hook CSF compared to the hypothetical result had the same catch been sold at the day's commercial prices.

Table 12: Comparison of revenue between Off the Hook and commercial market

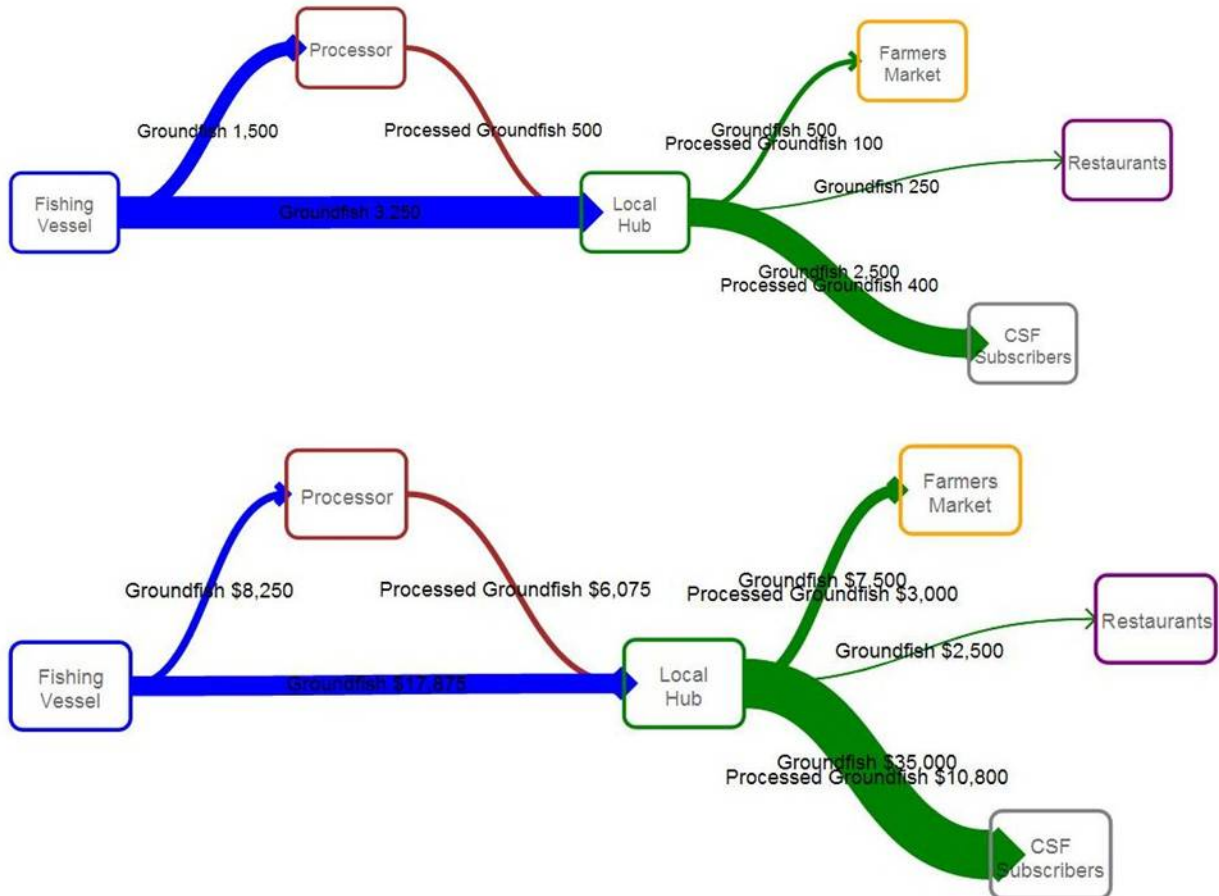
Balance sheet when majority of fish is sold through Off the Hook				Balance sheet if fishermen had sold the same catch on commercial market			
SALES	LBS	PRICE	TOTAL	SALES	LBS	PRICE	TOTAL
To Off the Hook (mix of species)	733	\$2.50	\$1,832.50	Cod	366	\$1.40	\$513.10
				Haddock	109	\$1.30	\$142.94
Hake (extra fish sold at wharf)	280	\$0.65	\$182.00	Hake	536	\$0.65	\$348.76
Delivery (paid to fisherman by OTH)		\$400.00	\$400.00	Delivery			\$0.00
TOTAL LBS	1013			TOTAL LBS	1013		
Total Revenue			\$2,414.50	Total Revenue			\$1,004.79
LESS EXPENSES:				LESS EXPENSES:			
Crew Share (20% of total rev.)	20.00%		\$482.90	Crew Share (20% of total rev.)	20.00%		\$200.96
Baiter (labour)	12 tubs		\$300.00	Baiter (labour)	12 tubs		\$300.00
Bait	12 tubs		\$480.00	Bait	12 tubs		\$480.00
Fuel boat			\$170.00	Fuel boat			\$170.00
Fuel truck			\$120.00	Fuel truck			\$0.00
Fishing supplies	hooks/etc		\$69.00	Fishing Supplies	hooks/etc		\$69.00
Monitoring			\$30.00	Monitoring			\$30.00
Admin			\$45.00	Admin			\$45.00
Overhead	5%		\$120.73	Overhead	5%		\$50.24
TOTAL EXPENSES			\$1,817.63	TOTAL EXPENSES			\$1,345.20
NET SETTLE (net profit)			\$596.88	NET SETTLE (net profit)			-\$340.41

The difference between a day's revenue selling to Off the Hook CSF and at commercial rates makes the difference between a successful business employing one fisherman and a crew member and an unprofitable operation.

The diagrams below show the simple value chain through which Off the Hook CSF, and other direct marketing initiatives, move products to markets. Figures and values are based on a typical season of Off the Hook CSF in Nova Scotia; one of the fundamental differences in this chain structure is that prices and

timing / amounts of product sold are determined by the fishers or a co-operative that they belong to. In this structure, processors operate with a 'fee for service' model, rather than purchasing and taking ownership of whole fish. The local distribution hub is operated on behalf of the fishermen and preserves their direct connection to the final product.

Figure 12: Direct marketing chain diagrams, volumes (kg) top and value (\$) bottom



Source: Estimated volumes (top, kg) and actual prices (bottom, \$) from a typical Off the Hook season

The fee for service model that Off the Hook uses provides two distinct benefits over the traditional 'transactional' model of the industry. In the first place, it supports the co-op's branding and marketing activities by maintaining the traceability that provides an authentic connection between producer and buyer. Additionally, it provides an incentive for these innovations and a commitment to high quality products and building customer relationships. In more transactional models, it is difficult for producers to be involved in bringing their products to markets and connecting with consumers. Strong partnerships between chain members could overcome this challenge if the essential quality of traceability can be provided.

Expanding Regional Marketing

Part of this project has been the development of an asset mapping exercise that has revealed clusters around the province in which small scale fishing vessels (bottom longliners) land fish in close proximity to processors and farmers markets. These locations are prime candidates for 'Off the Hook-type' direct marketing network solutions to provide consumers with local fish, and to incentivise sustainable fishing by providing fishermen with a fair price for their catch.

Figure 13: Nova Scotia Fisheries Asset Map

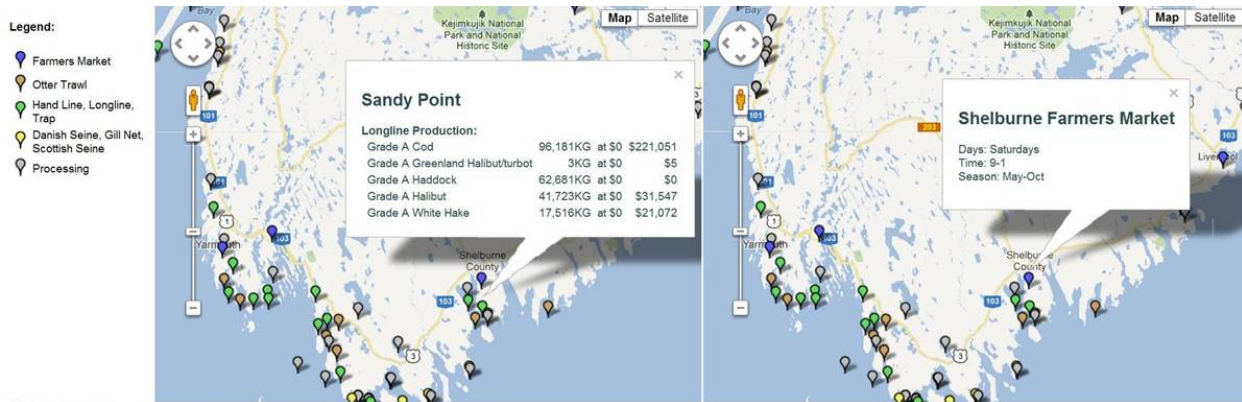


Source: Independently compiled

In the asset map, clusters of farmers markets, processors and ports where hand line / bottom longline / trap –caught groundfish are being landed provide an excellent starting point to explore the development of a network of 'Off the Hook' type solutions, with local processing drop-off points viable in areas where approximately 100 customer / subscribers can be found.

Shelburne

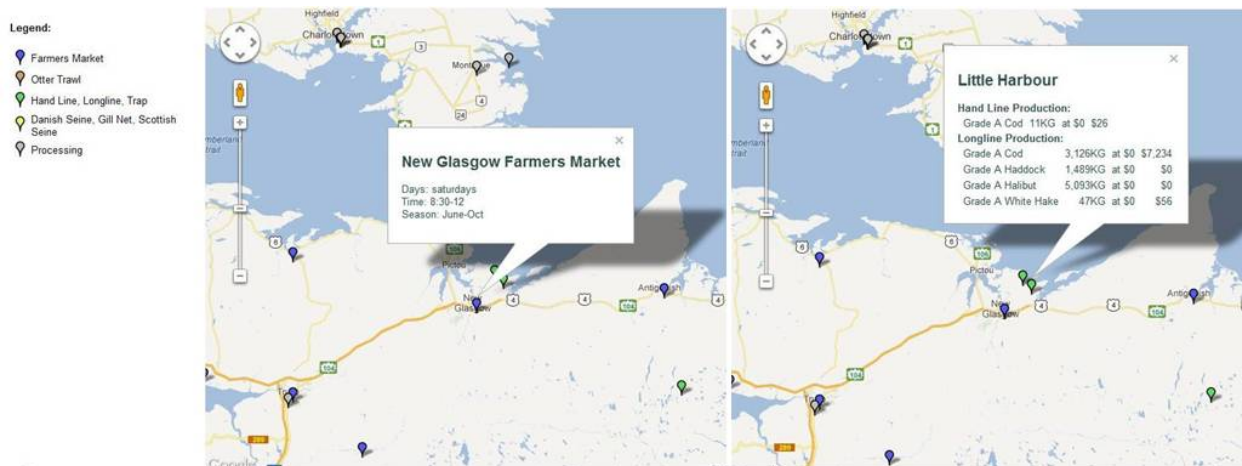
Figure 14: Sustainable Groundfish Production and Farmers Markets in the Shelburne County Region



The Shelburne Farmers Market services a county of approximately ~15,000 people through summer months and is currently in its fourth season of operation. High-profile vendors include organic farmers, providing greens and vegetables, local bakers featuring baked goods, and a local grass-fed beef and free range chicken and lamb producer. Other than from a local sushi cafe, there are no featured fish options, and there is no local provider of fresh, fair fish despite the market's proximity to Sandy Point wharf where tens of thousands of longline-caught groundfish were landed during the 2010 summer season. Nearby processing facilities may also allow for fresh fillets to be sold at this market.

New Glasgow

Figure 15: Sustainable Groundfish Production and Farmers Markets in the Pictou County Region



The New Glasgow Farmers Market brings approximately 30 vendors together every week during summer months and services a county of approximately ~45,000 people. In 2010, the market expanded from its 'pilot' status and built a permanent location with financial assistance from the Federal and municipal governments. The market is heavily focused on local products including certified organic cheeses, locally grown garlic and vegetables and local hand-crafted sheep's wool products.

There are no seafood products available at this market with the exception of lobster sandwiches sold on-site. However, the market is located very close to a working fishing wharf where owner-operators continue to land longline-caught groundfish in summer months. While there are no nearby processing facilities to provide filleted products, it is possible for fishermen to sell whole fish directly at such markets using mobile vendor permits.

Kings and Hants County

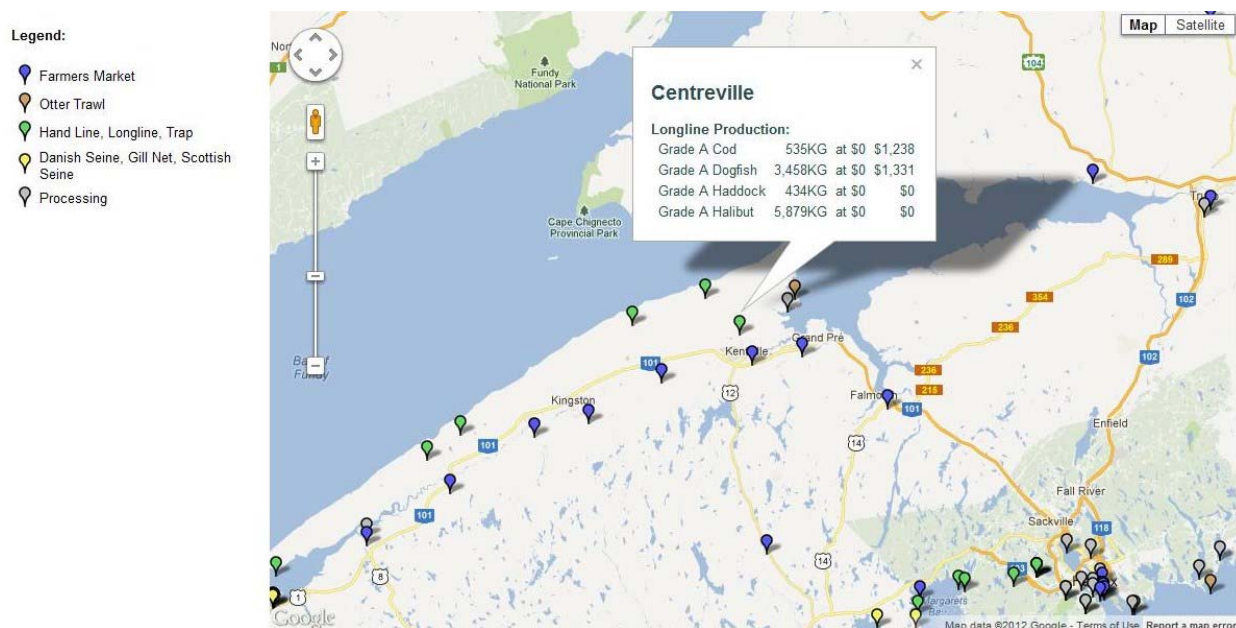
Kings and Hants Counties have some of the most active agricultural production in the province and correspondingly vibrant farmers markets. The Wolfville Farmers Market is particularly large, with approximately 60 active vendors every week. The Kentville and Windsor farmers markets nearby are smaller, but remain active with some 30 vendors each. The area population serviced is approximately 30,000 according to census municipal area divisions.

Figure 16: Farmers Markets in the Kings and Hants County Regions



None of these farmers market feature fishermen or fishing co-op members, though the Wolfville market does have one vendor offering seafood products. Given the size of these markets and their proximity to Centreville harbour, where cod, haddock and halibut are still being caught by independent fishermen, there is an excellent opportunity to provide fresh local fish to market customers.

Figure 17: Sustainable Groundfish Production in the Kings and Hants County Region



5.2 Certifications and Environmental Credentials

As retailers increasingly look for ways to distinguish their operations and appeal to rising consumer demand for sustainable products, many fisheries have engaged with seafood advisory guides and sustainable seafood certification programs. There are many of these initiatives currently operating, and more are being developed and refined.

For many markets, some type of sustainable seafood certification is a de facto requirement for access, and the Canadian government has been supportive of the certification of every Canadian fishery by the Marine Stewardship Council (MSC). Despite this push for seafood certifications as requirements for market access, it is not entirely clear they provide increased value to fishery chains, or that they support the ability of fishermen to make a living. A number of studies address consumer attitudes toward seafood guides that provide information about sustainable species. One study points out that there are approximately 200 of these “sustainable seafood guides” in use around the world. Some studies indicate that the guides are confusing or don’t have much impact on consumer behaviour.³⁵

One Monterey Bay Aquarium report found that one out of three seafood consumers have not heard of their sustainability guide. One report found that “seafood lists have raised awareness without changing buying patterns”. A 2009 poll of readers of *Intrafish*, a seafood industry magazine, “found that 72 percent of respondents believe the guides confuse consumers”.³⁶

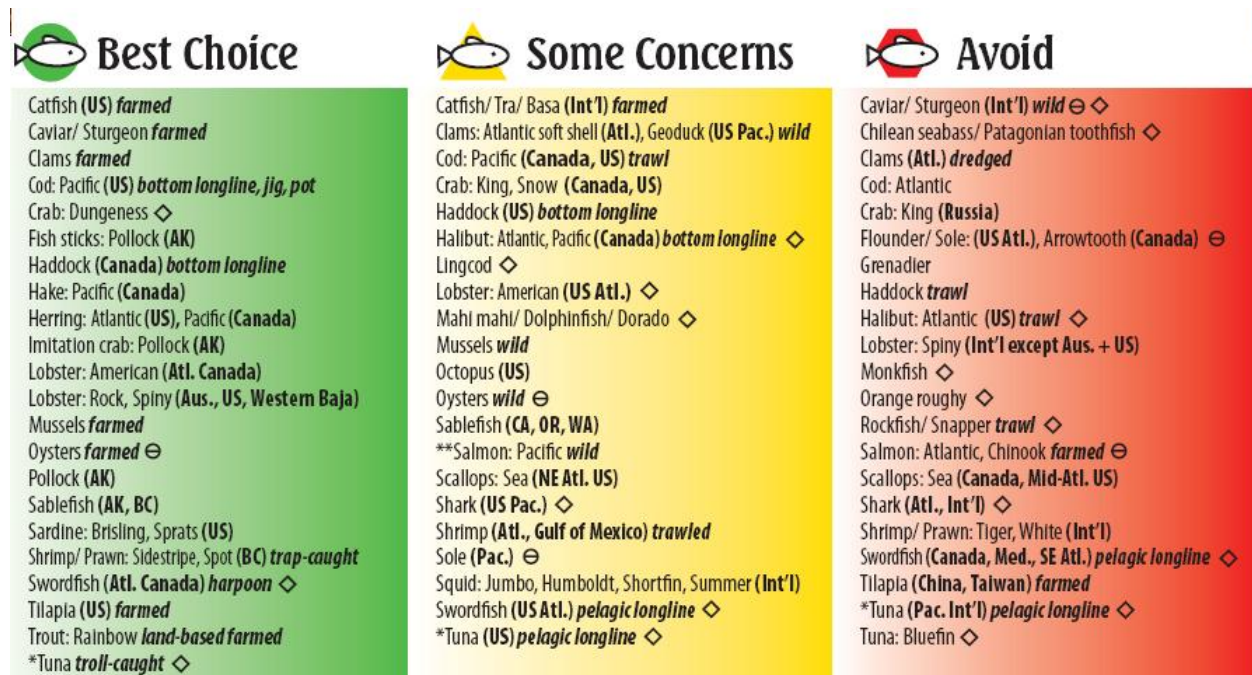
Monterey Bay Aquarium’s review of research points to three major barriers to using the seafood guides:

³⁵ Roheim, C. (2009) “An Evaluation of Sustainable Seafood Guides: Implications for Environmental Groups and the Seafood Industry” *Marine Resource Economics*, Volume 24, pp. 301-310.

³⁶ Ibid.

- Seafood vendors don't know enough about their products to answer questions or provide counsel about products on the guide.³⁷
- Labeling doesn't have enough information which means consumers can't determine things like catching method.³⁸
- Consumers don't always have access to the good choices listed in the guides – and guides don't always provide substitutions.³⁹

Figure 18: A 'wallet card' from SeaChoice - Canada's Sustainable Seafood Guide



*The category "Tuna" includes Albacore, Bigeye, Skipjack and Yellowfin tunas, but not Bluefin. ** Check seasonal recommendations for salmon at www.seachoice.org Version: 02/2007
 Abbreviations: AK=Alaska, Atl.=Atlantic, Aus.=Australia, BC=British Columbia, CA=California, Int'l=International, NE=Northeast, Med.=Mediterranean, OR=Oregon, Pac.=Pacific, SE=Southeast, US=United States, WA=Washington.

This level of consumer confusion suggests that seafood guides and certifications may be of limited value for small Nova Scotian fisheries. While certified fisheries are usually more environmentally sustainable than un-certified ones, this type of labelling may not make consumers willing to pay more to support small-scale or local food enterprises. Seafood certifications and guides lack the 'authenticity' offered by projects like Off the Hook CSF, other community supported fisheries, or products that are directly traceable back to a specific fisherman / community / story.

That seafood guides and certification have limited consumer appeal does not mean they are not useful tools. Some have significant environmental impacts. By partnering with sustainable seafood organizations, many retailers have been better able to communicate their own brands' commitments to sustainability. As well, these guides and certifications have provided an opportunity to spread awareness

³⁷ Ibid.

³⁸ Ibid.

³⁹ Ibid.

of sustainable seafood challenges and issues. However, the crucial step of providing more value to fishermen by convincing consumers to pay more is not usually reached.

Recent efforts to improve traceability in fisheries chains seem to offer more opportunities for identifying local and regional products and communicating with consumers about their role in a regional food system. Traceability offers an opportunity to move away from the overwhelming complexity of seafood guides and the questionable or misleading claims made by some eco-labelling certifications. There are many business to business traceability initiatives designed to ensure food safety and prevent fraud and mislabelling, but consumer-oriented traceability systems that allow consumers to trace their seafood back to individual fishermen, are becoming increasingly popular.

Off the Hook CSF has worked extensively with Thisfish, a seafood traceability system designed to be low-cost, easy to use and consumer focused. Thisfish identifies seafood with a unique coded tag that is simply attached to the fish by fishers at the time of catch. This tag is linked through thisfish.info to an online traceability system. Using computers or smartphones, consumers are able to use the codes to trace a product's origins, including who caught and processed the fish, when, where and how. The system provides fishermen the opportunity to create a profile that showcases their own operation, and allows consumers to send messages and questions to their fishermen. The traceability system can be equally used by industrial-scale operators as small-scale, regional producers, but the message that smaller producers can communicate may provide a much more compelling story to consumers.

5.3 Breaking the Commodity Curse

Section 4.3 above discusses some of the fundamental challenges posed in an industry that focuses on high volume, low value production. In this system, for example, costs of value-added processing and retaining value mean that, from a strictly economic perspective, it makes sense to ship fish around the world for processing before being consumed at home.

Simply, by failing to process haddock in the province, for example, Nova Scotia lost over \$7 million in export revenue in 2011, as well as the associated economic activity that would be generated by employment in the processing sector. Table 13 below shows the weight and value of imported haddock fillets compared to that of whole dressed exported fish. Filleted haddock includes fresh fillets, frozen fillets and frozen blocks of fillets. Haddock that has been processed further (i.e. salted, battered, etc) is excluded.

Table 13: Processed haddock imports compared with unprocessed exports

	2009		2010		2011	
	Quantity	Value	Quantity	Value	Quantity	Value
Filleted Haddock Imports	1,468,902	\$7,769,970	1,604,745	\$7,953,303	2,301,991	\$11,656,118
Whole Haddock Exports	10,330,536	\$27,728,668	9,076,951	\$22,511,739	6,301,269	\$16,981,210
Net GDP Impact		-19,958,698		-14,558,436		-\$5,325,092

Source: Fisheries and Oceans Canada, Statistical Services, 2012

This means that processing jobs have been moved to other areas of the world and other countries are able to ‘count’ this value-added step towards their own GDP. Over the past four years, the export of whole haddock and re-import of haddock fillets has directly cost Nova Scotia’s GDP between \$5 and \$20 million each year, not accounting for economic impact of employment in processing.

This simple economic truth highlights that the major problem for Nova Scotia’s fishing industry is the transactional model for production of high volume, low value commodity products. **A shift is required in the sustainable seafood industry in Nova Scotia: a shift away from a commodity based supply chain in which products are created, then “pushed” to the market, towards a Value Chain Management model based on market demand (i.e. consumer “pull”).** This will require a shift from a purely transactional model, in which individuals or companies interact only when they wish to buy or sell a product, to an alliance based model in which members of the chain share strategic information in order to insure the long term competitiveness of the overall chain, regardless of the size or market power of any one member of it.⁴⁰

Engaging value chain partners

In existing fishery value chains, prices and other information are only ever shared on a transactional basis. Processors will not tell fishermen how much they sell their fish for. Wholesalers will not reveal their supply costs to restaurants. Members of the supply chain often only know the identity of the other chain members directly adjacent to them – but this information is not shared across the chain. Fishermen do not know where their fish ends up. If a distributor sells fish to a wholesaler, who then sells the fish to restaurants, the wholesaler will not disclose to the distributor which restaurants receive them, for fear they will get cut out of the chain.

In addition to disempowering some chain actors, this lack of information and distrust stifles innovation in developing new regional markets. However, through our market based work (Off the Hook CSF), we have begun to create an alliance based supply chain supported by consumer pull. Our work with Off the Hook CSF and with trap caught shrimp fishermen in Chedabucto Bay, has involved building relationships not only with harvesters, but with other members of the supply chain, including processors, distributors, shippers, wholesalers, restaurants, and retailers. Through our partnership in SeaChoice, Canada’s

⁴⁰ Gooch, 2005

Sustainable Seafood Program, and collaboration with OceanWise and 15 other non-profit organizations (Conservation Alliance for Seafood Solutions) we are working on gaining retailer and buyer commitment to sustainable seafood purchasing policies in order to further strengthen market demand for sustainable seafood. Once those policies are in place, we have greater opportunities to work towards more meaningful labelling of origin and catch method for seafood products, and for introducing more sustainable local products when possible.

We have shipped bottom longline caught, tagged (using the Thisfish tracing system) halibut to restaurants, retailers, and wholesalers in both Halifax and Toronto. We have also connected a group of harvesters who dig clams by hand in the Digby area with an innovative restaurant in Halifax who will be featuring hand dug steamed clams on their menu this summer. In each case we have been able to provide the harvesters with a higher price than they would have received on the commercial market by first establishing a market demand, and then connecting industry partners to fill supply the product. We have worked to incentivize sustainable fishing practices by enabling harvesters to become price setters, rather than price takers.

We build value by telling the story that not only is seafood harvested with a low impact method better for the environment and our coastal communities, but the product itself is a better quality. Our streamlined supply chain insures that the product arrives from the sea to the table in a much shorter time than consumers are used to. We work to make sustainable fisheries economically viable by adding value, not by removing costs.

Through strategic value chain management, each individual or company in the chain works to maximize efficiency, streamline costs, and enhance quality of product or service in their part of the chain, while sharing strategic information, such as details of consumer demand, with other members of the chain. In so doing, the entire chain is better able to compete, by being able to more nimbly respond to consumer demand. The current model of commodity based supply in the seafood industry is a poor match for the current market trend towards sustainable, regional, seasonal food, as the supply chain is fragmented (in terms of information flow and chain of custody) and offers no connection between consumers and the people who catch the food they eat. This shift is necessary for the small operators in this industry to stay competitive, contribute to a regional food system and support local food production. Without this shift, it will be incredibly challenging for these operators to successfully compete in today's global commodity market.

6. Next Steps: An Ocean of Opportunities

6.1 Expanding to new species and fishermen

The success of Off the Hook CSF has provided the opportunity to build considerably on work in the groundfish sector. Over the coming months and years, Off the Hook CSF will grow to ‘the next level’ and expand beyond direct marketing to create a regional seafood hub based on the principle of producer empowerment. This will involve bringing more producers and buyers into the network and expanding into other species and other fisheries. While Off the Hook CSF began as a direct marketing initiative, it has rapidly transformed into a means to broadly reach a wide range of consumers who have never been interested in local seafood before.

6.1.1 Just for the Halibut

In order to gain another perspective on the regional fisheries value chain, Off the Hook CSF coordinated the sale of fresh halibut to restaurants and retailers in Halifax and Toronto on several occasions in the spring of 2012. The fish was caught by a fisherman from Off the Hook cooperative using a relatively benign gear type (bottom long line). The Thisfish tagging program was used in order to insure traceability and accountability throughout the chain, and distributed the fish through existing channels, rather than creating new ones. Through this pilot exercise, we were able to gain experience and knowledge of:

Fish Pricing

The first run of halibut sales (in March) was exploratory, as we had no real experience on how to price the product. Transportation costs were higher than expected, which eroded the profit margin at our (the distributor’s) level. We treated the first run of sales as a loss leader, as the successful shipment of excellent quality fish resulted in repeat orders and opened up new opportunities.

Once we were able to get a better understanding of transportation and packaging prices, we were better able to establish pricing based on actual costs. In order to ascertain the base market value for the raw product (the price we paid to the fishermen), we checked current auction prices in Boston and Portland for similar products.

Transportation

We worked with industry partners to provide logistic support and to arrange for shipping. Challenges we faced included cold chain provisions, packaging, timing, and pricing.

New relationships

Once we were able to get a better understanding of transportation and packaging prices, we were better able to establish pricing based on actual costs. In order to ascertain the base market value for the raw product (the price we paid to the fishermen), we checked current auction prices in Boston and Portland for similar products. This provided us with some assurance that we were going to be able to compete in the marketplace. The price paid to fishermen is expected to change once we are able to establish a better understanding of this market and the costs and revenues we can expect.

Traceability

The Thisfish traceability tool proved to be an effective value proposition, and was used to help restaurants and retailers provide a direct link between their chefs, their patrons, and the people who caught their fish. Chefs and retailers used the traceability tool as a marketing tool, and as a way to differentiate the product. The tool also allowed us to track the marketing impact of the distribution (mapping the traces), and allowed us to track where the final product ended up.⁴¹

Figure 19: Destinations and 'traces' of Off the Hook Halibut through Thisfish -



Figure 20: More Detailed Trace Map Showing Locations



⁴¹ In some cases it was not possible to differentiate between traces made by end consumers, and traces made out of interest by the general public, as some chefs chose to distribute the trace codes through social media.

Figure 21: Off the Hook Profile views on Thisfish.info. The peak in the profile views corresponds to our delivery of Halibut to Rodney's Oyster House in Toronto.

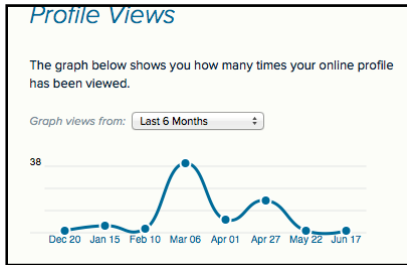


Figure 22: The chef at a high end Halifax restaurant took this picture of the tagged halibut and tweeted it to his 1500 followers as a way to attract them to the restaurant. Photo Credit: FID Resto

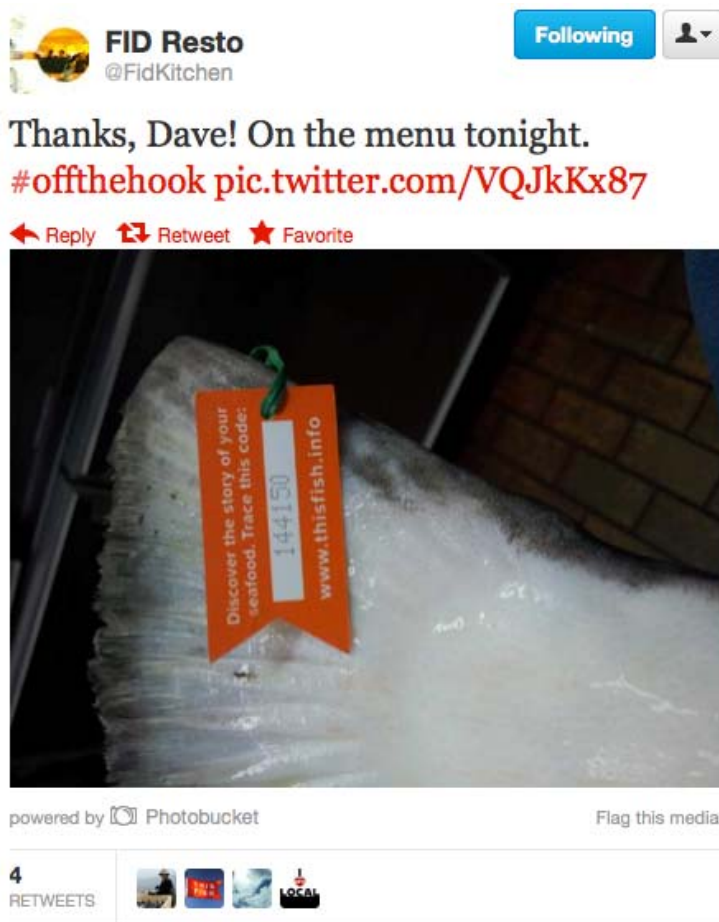


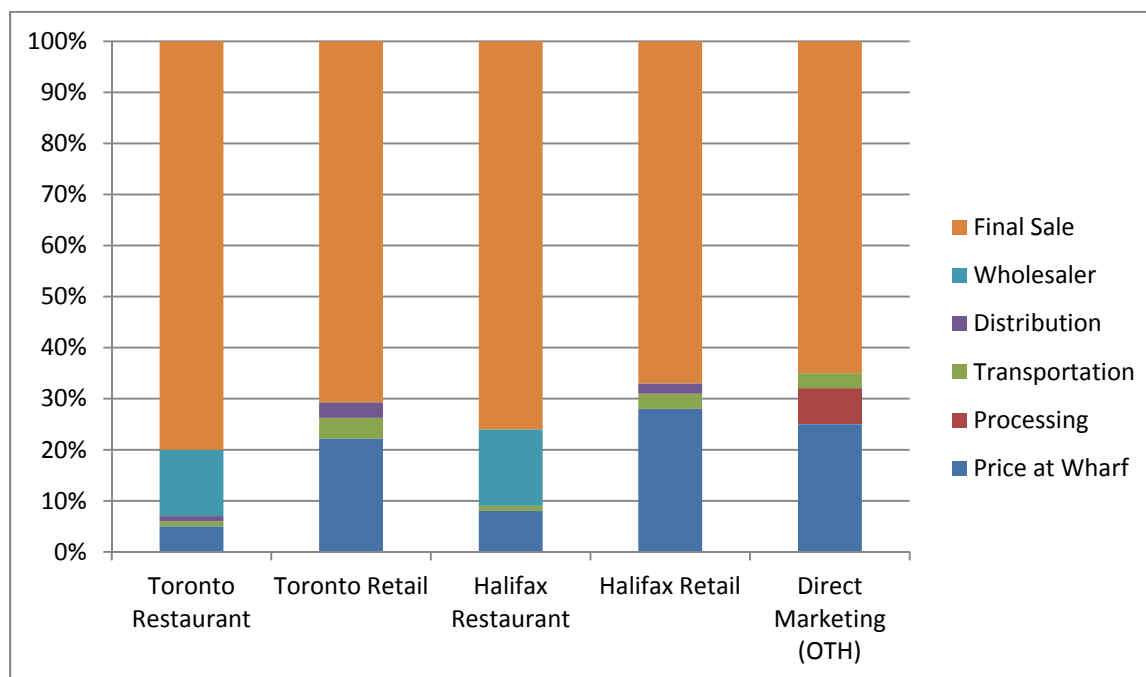
Figure 23: Fresh halibut provided by Off the Hook at a high end retailer in Halifax. Photo Credit: Off the Hook CSF



Results

In addition to building relationships and learning how to price, transport and trace this product, our coordination of this halibut promotion allowed us to significantly improve the economic position of the fishermen participating in this value chain. Figure 15 below shows the percentage share of the total value that went to different actors in the chain when the fish went to different places. Five different end consumer streams were tracked: Toronto restaurants, Toronto retailers, Halifax restaurants, Halifax retailers and direct marketing through the Halifax-based Off the Hook Community Supported Fishery.

Figure 24: Relative share of final cost of halibut sold in different distribution models



Source: Interviews with different chain participants

The share of the value added at each step in the chain varies significantly. The fishermen received between 5% and 28% of the final price paid in different markets, and the price paid by consumers at the point of sale, including the restaurants, retailers, and community supported fishery subscribers, ranged from 65% to 80%. However, in all cases, the cost per pound paid to the fishermen remained relatively constant, as we were careful to allow the fishermen to set their own prices. The significant difference was in the “Direct Marketing (OTH)” analysis, where the fishermen received the same price for the fish itself, but also captured approximately 65% of the value through the Off the Hook cooperative. This situation is unique, as the fishermen also own the cooperative that receives the final sale price paid by consumers.

In each case, value added at the restaurant level was higher than in any other segment in any of the pilot value chains we conducted. While this is to be expected with any feature item on a menu (restaurants mark up their feature ingredients by 300% to 600%), it is especially true of halibut, which is a premium priced fish. There is also no processor in the chain when restaurants are involved, as chefs generally prefer to receive premium fish whole so they can butcher it themselves. The restaurant in our Toronto pilot had a menu price of \$44 per plate for our halibut, whereas the dish sold for \$29 per plate in the Halifax pilot.

This experience demonstrated that re-distribution of value alone is not the only answer to the issue of declining prices to fishermen. While it seems obvious that increasing the value of the overall product can benefit each individual actor, this point is frequently lost in divisive and transactional negotiations in seafood sectors. The share of the value paid to fishermen in this analysis ranged significantly, but they

always received a price they were happy with. More importantly, the participation of the fishermen – in the tagging, branding and marketing of the product – made a critical contribution to increasing the overall value of the product.

The week immediately following our major Halifax CSF sales of halibut, the ex-vessel prices dropped dramatically in Halifax from approximately \$8/lb to only \$5.50/lb. According to some fishermen worked with, this drop was a direct result of a major vertically integrated seafood company ‘dumping’ halibut onto the local market to depress prices. Anecdotally, this is a common occurrence, and it highlights the precarious position that fishermen can find themselves in when they are forced to be price takers. It was impossible to predict that this company would take this action on a particular date; those fishermen who were unlucky enough to bring halibut to the market only days later than others would have seen their revenues drop by 45%.

6.1.2 Diver Caught Scallops

Digby scallops are iconic Nova Scotian seafood menu items, but are caught using destructive ‘scallop dredges’ that damage fish habitat and result in major losses of ‘bycatch’ species. Since scallops live on the bottom of the seafloor or partially buried in sediment, the teeth of a scallop dredge are specifically designed to disturb the sea bed surface. However, as with so many other fisheries, there are more sustainable options for scallop harvesting. Diver-caught scallops are becoming increasingly popular in higher value markets; even in Nova Scotia, where there is no diver-caught scallop fishery, diver-caught Baja scallops from Mexico can be found in restaurants.

Figure 25: A scallop dredge



Currently, scallops harvested by divers fetch a 20% price premium in the US and Canadian markets, and the retail and restaurant sector cannot find enough diver caught scallops to meet their demand (Dan Donovan of Hooked restaurant, Sean Dimin of Sea to Table, pers. comm). In addition to being easily marketed because of the environmental benefits, diver-caught scallops tend to be larger and higher quality, and are brought to market much faster than dredged scallops, resulting in a longer shelf life.

In spring of 2012, EAC completed a proposal to Fisheries and Oceans Canada requesting the development of a diver-caught scallop fishery in Nova Scotia. The approval of this plan will create a new fishery that any scallop fishermen could enter. No new quota can be allotted for this type of experimental fishery, and so any scallops caught by Nova Scotian divers will directly result in fewer dredge trips. We developed this proposal in partnership with Casey Fisheries of Digby, Nova Scotia, which has scallop quota that they intend to redirect to this new enterprise.

We have contacted three distributors in the US, Ontario and Nova Scotia who have committed to purchase diver caught scallops from Nova Scotia should they become commercially available. Collectively, they would like to buy 15,000 lbs of diver caught scallops per month. At current market prices, this would have a value of approximately \$300,000 per month, or \$3.6 million annually. This is an increase of over \$600,000 annually in the Nova Scotia economy through the value added by sustainable

harvesting. This is a conservative estimate, and only reflects the demand expressed by a handful of distributors. The actual market for diver caught scallops and its economic impact may be much greater. We also work closely with restaurants in Nova Scotia willing to switch their menus to include diver-caught rather than dredged scallops, and help promote this unique fishery.

This fishery does not require significant fuel consumption, dredge gear, or on-board freezers, and has low capital costs and barriers to entry. A diver caught scallop fishery could potentially provide significant employment opportunities for divers/fishermen in the province as it is developed.

Our next step is to complete a Conservation and Harvesting Plan (CHP) outlining specifically how the fishery will operate. This will include developing a plan to ensure that area closures are maintained and that very large scallops are allowed to spawn. Assuming the approval of the plan, which is likely considering the approval of our initial proposal and the support from existing quota-holders, this fishery could be operational as an experimental fishery as early as 2013.

6.1.3 Chedabucto Bay Trap Caught Shrimp

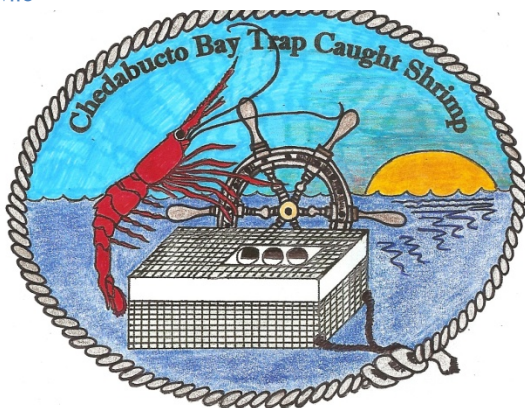
The Canadian Atlantic shrimp fishery takes place off the coast of Newfoundland northwards to Baffin Bay, and has become a major fishery with the collapse of groundfish populations. The landed value of Northern shrimps in Eastern Canada in 2005 was over \$240 million, which makes it the third most valuable fishery in Atlantic Canada after lobster and snow crab.

Northern shrimps are short lived, early-maturing fast growers that produce many young, and so are inherently resistant to fishing pressure. However, otter trawls are the primary gear used to catch shrimp. Numerous studies have documented and summarized the effects of this gear on seafloor habitats, and have consistently recognized it as one of the most damaging gear types in use. These severe gear impacts are a major environmental concern and should be an economic concern as well, as they destroy habitats and lead to lower fishery productivity.

An alternative to the otter trawl fishery was invented by a group of fishermen in Chedabucto Bay, near Canso, Nova Scotia. These fishermen invented a new gear and embarked on a unique shrimp fishery that uses modified lobster pots to trap shrimp in inshore waters. The fishery, which is active in winter months, was founded in the early 1990s as a means of supplementing summer income. However, for several recent years, the price of shrimp has simply been too low to justify operating the trap shrimp fishery, as lower quality trawl-caught shrimp depressed prices and the Chedabucto Bay catch was not distinguished.

After a lengthy partnership with the Ecology Action Centre, working to find ways to establish a distinct identity for trap-caught shrimp, it finally became possible in 2012 to find new buyers willing to offer a premium for the quality and marketability of the shrimp. A deal with North Nova Seafoods was arranged that now has the fishermen receiving approximately \$1.45/lb instead of the \$0.45-0.55/lb paid for the same type of shrimp caught by bottom trawl.

Figure 26: First draft logo for Chedabucto Bay Trap Caught Shrimp, produced by a shrimp fisherman's wife



The arrangement will bring approximately \$725,000.00 directly to fishermen in Canso, Nova Scotia. This is more than double the amount that would have been made if the shrimp were sold without the trap-caught distinction. In 2010 and 2011, the fishermen did not find it worthwhile to because of low prices; the quarter of a million dollars in revenue is directly replacing Employment Insurance benefits that the fishermen would otherwise be likely to rely on.

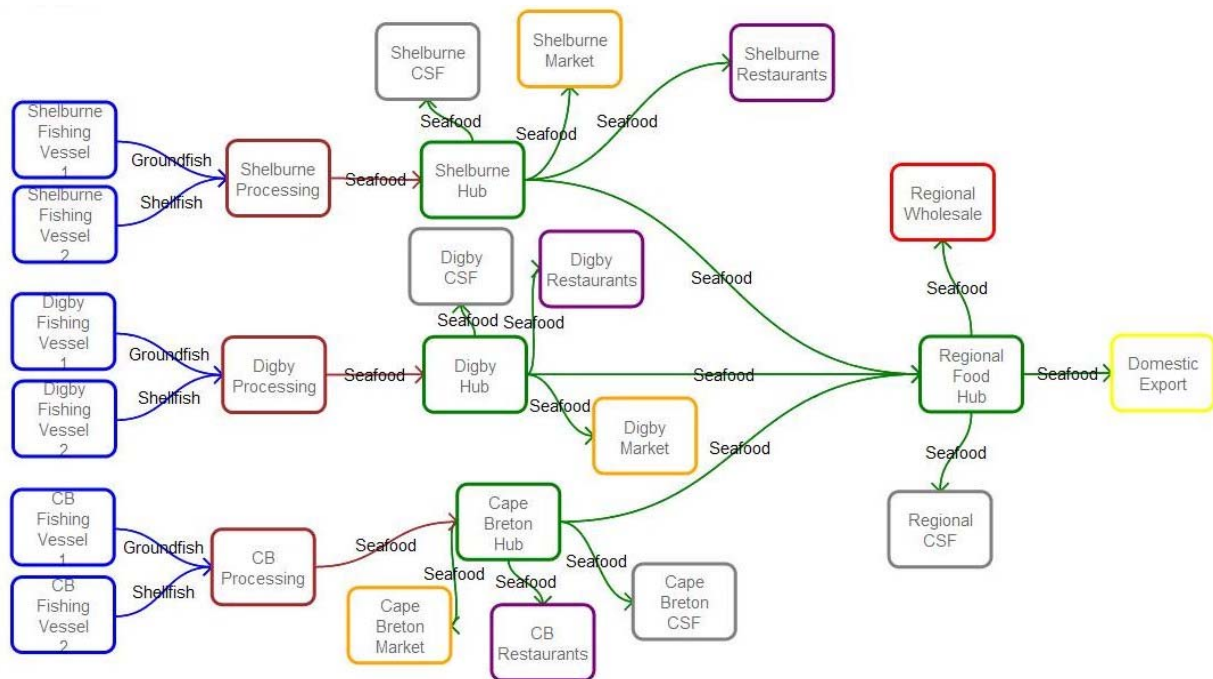
The Ecology Action Centre works with this fishery because it is an example of an innovative,

environmentally sound, owner-operator fleet that can set an example. It is hoped that Chedabucto Bay trap-caught shrimp can become a prime example of a small-scale sustainable fishery producing top quality Nova Scotia seafood that can be promoted for both local and export markets.

6.2 Building a regional seafood hub

While the complexity of the issues and the structure of the value chains present significant challenges in reforming the seafood sector in Nova Scotia, we believe that the high profile of local food issues and the successes and popularity of our early work have presented significant opportunities. We have now built the relationships and connections needed to begin to create a network that supports healthy, prosperous fishing communities and the regional food system they can contribute to. Over the coming months, we hope to expand on the marketing, branding and relationship-building successes of Off the Hook CSF to create a regional seafood network based on the principles of regional production and consumption and producer empowerment.

Figure 27: A Regional Sustainable Seafood Distribution Network



We envision a network based on fishing vessels from different areas of the province operating in a network of local food distribution platforms. This type of network could handle smaller volumes of fish from small producers while maintaining high quality and traceability in the chain. Landed whole fish could be taken directly to small-scale processors willing to work under a ‘fee-for-service’ model and then continue to local distribution hubs. These local hubs would redirect whole and processed fish to farmers markets, local restaurants and community supported fishery subscribers, depending on local demand. A portion of this product would also be directly to a ‘regional food hub’ located in Halifax, where the population base supports aggregation and redistribution. While licensing restrictions would prevent this hub from handling some species, such as lobster, the ability to include even a small variety of seafood products would greatly enhance local and regional appeal for this operation.

One possible model for a local distribution hub would establish a physical location based around a retail and CSF distribution point combined with wholesale operations. Being able to combine wholesale operations and domestic export to nearby provinces with local retail and a CSF pick-up location could greatly increase the impact of this type of initiative.

In addition to providing a source of environmentally sound and socially beneficial seafood products, the regional seafood network will provide a place to connect producers with distributors / buyers interested in sourcing more responsible and sustainable seafood products. We believe that this network could provide a model for the strategic value chain management needed to collaboratively maximize efficiency, streamline costs, and enhance quality of product or service in their part of the chain, while sharing strategic information with other members of the chain. This network will also work to provide

the information flows needed to ensure that fishermen, and all members of the chain, are able to secure fair prices for their products based on local supply and demand.

This network includes elements of direct marketing, seafood traceability and regionalism. Over time it will allow small-scale owner-operator fisheries to directly benefit from the growing demand for local and sustainable food. Most importantly, it will help Atlantic Canadian small-scale fisheries to find their important place in a shifting regional and global food economy. As this work develops and fisheries begin to secure higher prices, their economic contribution to rural areas of the province will continue to grow. These impacts on fishermen and coastal communities may create a positive policy space to help enable more fishermen to participate in these regional food systems.

Moving away from a commodity based supply chain in which products are created and pushed to the market towards a value chain management model based on market demand is not a simple undertaking. This work requires industry partners to embrace new ways of thinking and doing business. Sharing strategic information to build a competitive chain requires trust between actors. However, the current challenges that the industry is facing provide an excellent opportunity to begin this transformation. The alternative, in the face of declining prices, unfavourable exchange rates, and international competition, is for the industry to continue to consolidate, eliminate jobs, reduce margins and sacrifice the marine environment to land more and more fish. Fortunately, there are better solutions.

References

- Beaton, Sadie (2010). "Local Seafood Direct Marketing: Emerging Trends For Small-scale Fishers in Nova Scotia". Anchor Consulting.
- Coletto, David, Lydia Di Francesco, and Jaime Morrison (2011). "Seafood Survey: Public Opinion on Aquaculture and a National Aquaculture Act". Abacus Data Inc., May 16, 2011.
- Copes, P. (1970). The backward bending supply of the fishing industry. *Scottish Journal of Political Economy*, 17(1): 69-77
- Curran, A. (2005) "Taking the Pulse of Active Transportation: Measure the Built Environment for Healthy Communities". Community Counts, Nova Scotia Department of Finance: Action for Neighbourhood Change, United Way of Halifax Region.
- Dahle, Cheryl (2009). Changing the Future of Wild Fish: An Entrepreneurial Approach to Sustainable Solutions. Reimagining Complex Systems, Ashoka Changemakers. Discovery Group and Ashoka Initiative, <http://fof.centralstory.com/fof/wp/wp-content/uploads/2009/07/FutureFishReport.pdf>.
- Fisheries and Oceans Canada (2006). Impacts of Trawl Gears and Scallop Dredges on Benthic Habitats, Populations and Communities. Canadian Science Advisory Secretariat.
- Fisheries and Oceans Canada, Maritime Region (2003). "Groundfish: Integrated Fisheries Management Plan,"
- Fisheries and Oceans Canada, Policy and Economics (2012). "Fishery Landings Report", generated by request in February 2012.
- Fisheries and Oceans Canada, Scotia-Fundy Sector, Maritimes Region (2011). "Inshore Lobster Integrated Fishery Management Plan Lobster Fishing Areas 27 - 38".
- Fisheries and Oceans Canada, Statistical Services (2012). "Import and Export Data Report", generated by request in February 2012
- Fisheries Statistics: Commodities. Food and Agriculture Organization of The United Nations, 2006.
- Fuller, Susanna, Candace Picco, Jennifer Ford, Chih-Fan Tsao, Lance Morgan, Dorthea Hangaard, and Ratana Chuenpagdee (2008). *How We Fish Matters: Addressing the Ecological Impacts of Canadian Fishing Gear*. Ecology Action Centre, Living Oceans Society, and Marine Conservation Biology Institute.
- Gardner Pinfold, and Rogers Consulting Inc. (2007). "Nova Scotia Seafood Processing Sector: State of the Industry and Competitiveness Assessment". Nova Scotia Department of Fisheries and Aquaculture.
- Gardner Pinfold, Revenue Management Ltd., Market Research Associates and Seafood.com (2010). "From Trap to Table -A Long Term Value Strategy for the Canadian Lobster Industry". Lobster Council of Canada.

Gooch, M. (2005). Drivers, Benefits and Critical Success Factors of Developing Closely Aligned Agri-Food Value Chains. George Morris Centre, Guelph, Ontario, Canada.

Government of Canada, Fisheries and Oceans Canada (2009). "Provincial Breakdown of Canadian Fish and Seafood Exports in 2008". <http://www.dfo-mpo.gc.ca/media/back-fiche/2009/hq-ac05a-eng.htm>.

Gudmundsson, Eyjolfur, Frank Asche, and Max Nielsen (2006). Revenue Distribution Through the Seafood Value Chain. FAO Fisheries Circular. Rome: Food and Agriculture Organization of The United Nations. <ftp://ftp.fao.org/docrep/fao/009/a0564e/a0564e00.pdf>

Hunter, Beth, and Sarah King (2008). "Out of Stock: Supermarkets and the Future of Seafood". Greenpeace Canada.

Íslandsbanki (2011). "Per Capita Seafood Consumption." DataMarket. <http://datamarket.com/data/set/1e5n/#!ds=1e5n!xb2=3&display=bar&s=b9u>.

Kaplinsky, R. (2000). Spreading the Gains from Globalisation: What Can Be Learned from Value Chain Analysis? Institute of Development Studies, Working Paper 110, Sussex.

Knight, Andrew K., and Hema Chopra (2011). "Growing Demand: Local Food Procurement at Publicly Funded Institutions". Nova Scotia Department of Agriculture and Nova Scotia Department of Fisheries and Aquaculture.

WWF Canada, and EKOS Research Associates (2011). WWF Sustainable Seafood Survey, June 2011.