

# Made in Japan: The Japanese market and herring roe production and management in Canada's southern Gulf of St. Lawrence

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## Abstract

The herring roe fishery in Canada's southern Gulf of St. Lawrence is a productive fishery that lies outside the confines of privatized arrangements. Yet, this fishery is compromised by its dependence on the Japanese seafood market. Consideration of the efficiency of this fishery needs to account for the role assumed by this market in setting fishing practices. A more ecologically and economically efficient use of the herring resource requires greater attention to supply chain integration by local harvesters, processors and buyers prior to engaging with distant markets. This is necessary regardless of the property rights regime that is in place.

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## 1. Introduction

In the 1960s and 1970s, the label 'Made in Japan' was ubiquitous for many commodities sold in western markets. Although 'Made in China' is dominant amongst many manufactured goods in the current global market, the term 'Made in Japan' still resonates, yet in a more hidden manner. In the 1990s, Japan became a net importer of food items [1–4]. This combined with the growing power of retailers in global food markets means that the buyers of goods such as fresh fruits to seafood have secured greater leverage over distant food producers [5–7].

In Canada's southern Gulf of St. Lawrence, the herring roe fishery is second in value to only lobster, yet the harvesters of this resource have a fishery whose practices and value are largely structured by the Japanese market. In an era where greater emphasis is given to securing fuller property rights and greater local regulatory control over fisheries, the Japanese market stands testimony to the consideration that local-level management is heavily

influenced by global market forces. If the herring fishery is to become a long-term sustainable venture, greater attention needs to be given by industry participants and the Canadian Department of Fisheries and Oceans to providing a more tightly integrated supply chain and knowledge base at the local level. Such measures may enhance the ability of local actors to interface with global markets.

The remainder of this paper is divided into six sections. Section 2 reviews the nature of the herring roe fishery in Canada's southern Gulf of St. Lawrence. Next, we assess the nature of resource management in the fisheries, and the reasons why the favoured move towards full property rights in fisheries will not necessarily foster the development of a more sustainable herring fishery. In Section 4, we argue that a 'buyer-driven' food chain centred in the Japanese seafood market has implications for the management of the herring roe fishery. Overdependence on long-distance markets has negative implications for the sustainable management of the herring roe fishery even if this fishery becomes subject to a greater privatization of property rights. Our methodology is outlined in Section 5. Section 6 provides our data and analysis of the implications of the Japanese seafood market for the herring roe fishery. Finally, Section 7 is an overview of the public policy

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implications for managing a fishery that is largely driven by a specific commodity (herring roe) for a select market (urban Japan). Canada's Department of Fisheries and Oceans (DFO) and local users need to address this by: (1) seeking greater product differentiation and more markets, and (2) developing a greater knowledge base in the area of supply chain integration.

## 2. The herring roe fishery in Canada's southern Gulf of St. Lawrence

The herring fishery in the southern Gulf of St. Lawrence is divided between a fixed gear inshore fishery and a mobile gear midshore purse seine fishery. In the wake of intensive fishing pressure in the 1970s, the DFO began to regulate the access and efforts of both of these fisheries. Despite this, herring stocks crashed in 1981 as seiners harvested 80% of the Total Allowable Catch (TAC) [8]. Measures were taken to reduce the seiner fleet, as well as the TAC allocations between seiners and the inshore fleet. By the 1990s, the allocation was split 77–23% in favour of the inshore fleet [9], an allocation that remains today [10]. In addition, by the 1980s, the herring market shifted from an almost exclusive reliance on fish meal to the supply of herring fillets to European markets [9]. By the 1990s, the herring roe fishery that is the focus of this paper began to take hold and came to influence harvesting and processing practices.

Southern Gulf of St. Lawrence coastal communities are supported by lobster and herring fisheries. The former is a thriving industry in the eastern portions of the Gulf. During the 1990s, a boom in lobster catches and prices compensated many fish harvesters in parts of Eastern Canada for the losses incurred by the rapid downturn and closure of many parts of the ground fishery [11].<sup>1</sup>

Not all communities in the area equally benefit from the lobster and herring fisheries. Easterly ports such as Cribbons Point, Ballantynes Cove, Morrystown and Arisaig attained many economic benefits from the high value lobster fishery; westerly ports such as Pictou, Tony River and River John have witnessed poor lobster landings in recent years.<sup>2</sup>

Migrating Atlantic herring is fished primarily for roe, the most lucrative product extracted from the species. In the eastern portion of the 16F management zone, ports such as Cribbons Point, Ballantynes Cove and Arisaig, the majority fish harvesters' incomes are based on the lobster

fishery.<sup>3</sup> These communities are located in the province of Nova Scotia whose waters are governed by the Department of Fisheries and Oceans (DFO) Gulf Region. In 2005, lobster constituted just over 11% of landings in the Gulf Region of Nova Scotia, but over 55% of the total value. This trend is indicative of the fisheries of the three Canadian maritime provinces of Nova Scotia, New Brunswick and Prince Edward Island since the early 1990s [11].<sup>4</sup>

While herring is not as valuable as lobster in terms of value, it is one of the top species in terms of landings in all of Eastern Canada. As the data in Table 1 show, in the five Eastern Canadian provinces in 2005, herring constituted over 19% of total landings, but less than 3% of value in the fisheries. Despite the high volume and low value nature of the herring fishery, there are variations throughout Eastern Canada. The portion of Nova Scotia in the Gulf Region stands out as having the greatest value per tonnage in this part of the country (see Table 1). This reflects the fact that the production of herring roe is maximized here, as opposed to lower value products such as smoked herring (produced in the portion of New Brunswick in the Maritimes). While herring roe is sent to the Japanese market, smoked herring is largely exported to the Dominican Republic [12].

In August and September of each year, 'fall herring' are harvested to obtain roe from the females during their annual spawning migration. This raw material is exported to Japan and further processed prior to reaching retail markets. In recent years, poorer grade herring roe has been flavoured thereby providing a year-round product to younger Japanese consumers who prefer it to 'unflavoured herring roe' [12].<sup>5</sup> Recently, the roe fishery has faced: low market value, low-quality product, low price, an over supply of raw material, great levels of resource waste and a high degree of reliance on the Japanese market.

The herring fishery in 16F plays an important supplemental role to lobster. In the western portion of 16F, the lobster fishery has been less profitable in recent years causing harvesters in the Tony River and Pictou area to become increasingly reliant on the herring fishery as a vital

<sup>3</sup>Canada's Department of Fisheries and Oceans has six administrative units for governing oceanic fisheries: the Newfoundland, Gulf, Maritimes, Quebec, Central and Arctic and Pacific North Regions. Within each of these regions, administrative units are used for various fisheries. These do not always correspond to provincial divisions. For example, Area 16 deals with the herring fishery in the southern Gulf of St. Lawrence, an area covering New Brunswick, Nova Scotia and Prince Edward Island provincial waters along the Gulf of St. Lawrence. Area 16 is divided into several subunits with 16F (within Nova Scotia) being the object of investigation for this study. The Maritimes Region is the new name for the Scotia-Fundy Region. Hence, the references to data in this study for the Maritimes Region are recorded as being for the Scotia-Fundy Region in the original sources.

<sup>4</sup>The data presented here are calculated from the data found in Fisheries and Oceans Canada (2005) [11].

<sup>5</sup>Later in this paper, we briefly discuss the greater success of the British Columbian herring roe fishery; herring roe from the west coast are preferred to those from Eastern Canada.

<sup>1</sup>Fisheries and Oceans Canada [11] provides data on fishing landings, value, fish harvesters and vessel types for the past decade and a half. An analysis of the data shows that while overall landings declined in Eastern Canada since the 1992 ground fish moratorium, the overall value of the fishery increased largely due to increased landings of lucrative shellfish species such as lobster, shrimp and snow crab.

<sup>2</sup>The poorer lobster landings in the westerly ports are most likely due to their adjacency to the Northumberland Strait separating Prince Edward Island from New Brunswick and Nova Scotia. In the past decade, there has been a decline in lobster landings in the Northumberland Strait area.

Table 1  
Herring landings (tonnes), value ('000) and value/tonnage in Eastern Canada, 2005

Region	Landings	Percentage of total catch in the region	Value	Percentage of total value in the region	Value/tonnage
Gulf (Nova Scotia)	9135	37.6	3504	4.3	383.5/tonne
Maritimes (Nova Scotia)	45,481	18.7	10,952	1.7	240.8
Gulf (New Brunswick)	36,196	51.3	9331	6.5	257.8
Maritimes (Nova Scotia)	26,333	56.4	4882	9.0	185.39
Gulf (Prince Edward Island)	15,088	37.0	4133	3.1	273.9
Quebec	5267	9.2	1480	0.9	280.9
Newfoundland and Labrador	25,506	7.1	6111	1.2	239.6
Total	163,007	19.4	40,394	2.3	247.8

Source: Based upon data contained in [11].

source of income.<sup>6</sup> These harvesters are much more affected by low prices, but are also less likely to sit out the season despite low market value. We will consider these factors in more detail below. For our purposes, the critical question is the degree to which the high volume and low value herring fisheries present challenges for understanding the linkages between common property fisheries and global markets. What is the impact of the latter on the former?

### 3. Common property resources and the herring roe fishery

A transition to a greater degree of private property rights is debated as the best means available for the successful utilization of common property resources (CPRs). In the fisheries, this is often realized in the form of measures such as the use of Individual Transferable Quotas (ITQs) in Canada [13], Iceland [14], New Zealand [15] and the United States [16]. Other quasi-private measures include the Individual Value Quotas (IVQs) in Norway [17], and tradable fishing days in the Faroes [18].

Small pelagic fisheries account for four out of the top five species commercially fished globally, are remarkably resilient and do not show the same rates of decline as demersal fisheries [19]. Despite the relative absence of ITQs in pelagic fisheries, the purse seine herring fleet in the Bay of Fundy was the first case of ITQs on the East Coast of Canada [20,21]. In 1976, boat quotas were introduced and a system of ITQs was fully implemented in 1983 [13]. The quotas were not legally binding and a minimal legal framework was used for reporting catches. In some years, catches were underreported by up to 50% [21]. A future implementation of ITQs in the herring fisheries of the northeastern United States may result in greater economic efficiency, largely from a smaller fleet of trawlers [22].

Despite the failures of the ITQs in the herring fishery, these were introduced in Canada in the early 1990s, after the demersal stocks in southwest Nova Scotia were harvested well ahead of the end of the 1989 season [23].

<sup>6</sup>There are no exact data for this statement; it is based upon the impressions of harvesters interviewed for this study who reside in these communities.

What began as a voluntary system of individual quotas in 1991, rapidly developed into an ITQ system with trading rights and a user pay system of dockside monitoring and grading. Despite disagreements over transferability limits, the participants largely accepted the new system [13].

Given this, what are the possibilities for an ITQ system in the herring roe fishery in the southern Gulf of St. Lawrence? If such a fishery is introduced, will this result in the type of efficiencies favoured by economists and increasingly most policy-makers? We argue that solutions to the 'inefficiencies' in the herring roe fishery cannot be resolved by the insertion of a quasi-property right ITQ fishery. Regardless of the property rights regime, the supply chain linking property holders to end markets demands serious consideration. Fish harvesters and processors (as we shall see below) are 'locked' into a dependency on the Japanese market. There are few local or more regionally adjacent markets that demand heavy supplies of herring fillets. This contrasts with the situation in Norway where pelagic fish harvesters have access to the fillet market in Eastern European nations, as well as the salmon feed market in Norway [5].

It is necessary to consider factors which are in theory 'external' to CPR management regimes. What role do end product markets have upon the design and operation CPR management regimes? In the case of the herring roe fishery in Canada's southern Gulf of St. Lawrence, what are the implications of the Japanese seafood market for the management of this fishery?

### 4. Global commodity chains and the Japanese seafood market

Over the past three decades, Japan has acted as one of the 'lead drivers' in altering the nature of commodity food chains, as it has shifted from a domestically sourced food market to an import-oriented one. In the late 1990s, Japan imported two-thirds of its food supply. It became the world's largest net importer of food [4]. In the 1960s, Japan produced about 79% of its countries' caloric intake; in 1997 this decreased to 41% [2]. In 2002, domestic production stood at 40% of caloric needs. Fisheries

imports rose after the late 1970s when fishing nations began to implement the 200 mile limit in domestic waters. In 2001, Japan only provided 49% of its seafood needs [1]. Even in the case of farmed Pacific salmon, in the years from 1990 to 2000 Japan went from the world's largest producer to a net importer [7].

The Japanese dependence on food imports does not mean that buyers are without power. Food is sourced from a variety of producers throughout the globe [3]; producers compete with each other to gain access to the lucrative but demanding (in terms of quality) Japanese market. Japan, like other affluent food importing nations exercises considerable leverage over producers. It is at the end of a 'buyer-driven' food chain. Gereffi distinguishes between 'producer-driven' and 'buyer-driven' commodity chains [24,25]. In 'producer-driven' chains, the greatest economic concentration occurs further upstream. In the automotive sector car manufacturers wield greater power than downstream car dealerships. Another case in point is the oil and gas industry where vertically integrated giants dominate firms which merely sell the end product to consumers.

'Buyer-driven' commodity chains are characteristic of 'light industries' such as apparels and agro-food production [26]. There are a multiplicity of producers and a limited number of retailers. Design companies such as Nike contract out production to manufacturers in developing countries [24], and food retailers source fresh and manufactured food items from a variety of areas [7,27]. The end result is the same, 'buyers' have more influence than 'processors' and 'producers' in global food chains. This is reinforced by food safety measures such as the World Trade Organization's Sanitary and Phytosanitary (SPS) mechanism, and traceability measures such as HACCP that can 'trace' food along the various stages of the food chain from production to consumption.<sup>7</sup>

For commercial fisheries, long-distance markets have historically been pivotal in imposing pricing and quality arrangements. This was true of both the mercantile-oriented saltfish and industrial fresh frozen codfish production in the 19th and 20th centuries [28]. However, with the almost simultaneous move towards 'vertical distintegration' by many major fishing companies, and the increased concentration and buying power of global retail giants, power has shifted down the 'food chain' in favour of the latter [6].

A major challenge for the future viability of coastal communities is the need to incorporate knowledge about global food chains into fishery management plans. In this paper, we show how knowledge of the global food chain

for herring roe is indispensable for restructuring herring fishery management plans in Canada's southern Gulf of St. Lawrence.

## 5. Methods

In the summer of 2004, semi-structured interviews were conducted with fish harvesters, buyers and processors, representatives from the DFO, Gulf Nova Scotia Herring Federation (GNSHF), the Gulf Nova Scotia Bonafide Fishermen's Association (GNSBFA) and a fisheries consultant. Interviews were conducted either face-to-face or by telephone.

All harvesters are from the Nova Scotian portion of the southern Gulf of St. Lawrence; this is an especially important group given that the value of herring production in Eastern Canada (see Table 1) is greatest here; this is the group of harvesters most likely able to realize 'greater value' from improvements to the herring fishery. The GNSBFA provided a preliminary list of harvesters from their membership identified as potential respondents (see Table 2).<sup>8</sup> Individuals were chosen on the basis of participation in the herring fishery, and attempts were made to choose harvesters who fished in both the spring and fall fisheries. Interviews aimed to include harvesters from a number of areas within the 16F herring management zone.

The initial list of buyers and processors [ $n = 27$ ] became problematic when conducting the follow-up calls as it became apparent that many companies either purchased their herring from southwest Nova Scotia [ $n = 11$ ], or were no longer processing herring ( $n = 4$ ). We received three refusals to participate and two companies could not be contacted. This considerably narrowed the list of potential interviewees. We completed interviews with three out of the seven companies left on our list. The other four companies agreed to be interviewed at a later date, but after several call-backs, we discontinued our efforts. The three companies interviewed, however, provided significant insight on the local industry.

The interviews captured respondents' views surrounding the management, sustainability, and efficiency of the herring fishery. The interview data supplied extensive information on the current use of the herring resources, and also provided suggestions on how the fishery could be improved. A critical issue is the impact of 'buyer-driven' commodity chains not only on pricing and food quality,

<sup>7</sup>HACCP stands for Hazard Analysis at Critical Control Points. This is now a standard procedure in the food industry. For the herring and mackerel fisheries, one concern is the presence of histamines, something that can be detected in a HACCP system. In recent years, herring product from Eastern Canada was rejected in Japan due to the presence of histamines (see [12]). The SPS measure includes reference to HACCP. For an analysis of the impact of food safety policies in fisheries and aquaculture, see [27].

<sup>8</sup>This list does not represent all potential herring harvester in area 16F. It only represents the 'relevant population' who are members of the GNSBFA. In 2004, preliminary data showed 144 potential herring harvesters in Area 16F. Thus, the 'initial population' in Table 2 represented less than 27% of total potential herring harvesters in 16F; however, as we note the 'relevant population' for the sample of GNSBFA is smaller than the 'initial population'. The same may be true for the 'initial population' in the Southern Gulf as a whole. For more detail on licensed herring harvesters in the Southern Gulf, see Fisheries and Oceans [29].

Table 2  
Herring industry stakeholders in the southern Gulf of St. Lawrence (Nova Scotia [16 F]): interview population

Group	Initial population	Relevant population	Interviewed	Percent of relevant population interviewed
Herring harvesters	40	31	18	58
Herring federation officials	3	3	2	67
Buyers/processors	27	12	3	25

but also on fishing practices and managerial strategies. What do markets mean for future management practices?

## 6. Analysis of the herring roe fishery

### 6.1. The production and sale of herring roe

Japanese buyers influence the timing of the herring fishery (as measured by quality roe production). Japanese technicians are often present during the processing to ensure activities are carried out in accordance with Japanese specifications. Bestor notes that issues such as appearance, texture and other forms of visible quality, or *kata*, are indicators used by the Japanese to evaluate the presence of internal flaws or poor quality [30]. Buyers and processors stated that technicians monitor quality control, attributes of roe such as roe shape, degree of damage, and apply grading standards. Japanese buyers play a significant role in setting the price of the southern Gulf roe. The main issues governing price include: the underutilization of herring, an oversupply of the raw material, reduced quality, and lax handling practices by both fish harvesters and processors.

The most significant concern is the underutilization of fall herring. When herring are processed, the primary product is roe extracted from the females. Males are often compiled with female carcasses (referred to as ‘splits’) after the roe has been removed. A GNSHF representative commented that these products are then often used to produce fish meal at an extremely low price (Respondent 7), or as an alternative, are shipped to the New Brunswick smokehouses which, as we have seen, process smoked herring for the Dominican Republic market. A buyer stated that the quality of roe is poor because of the high volume of fish being caught in such a short time, stating that “... just as much [herring] go for fishmeal as is processed.” He claimed that there is about a 7% roe yield from the herring being caught, with the remaining 93% of the resource being smoked or processed for low value meal (Respondent 16). The rapid processing of herring roe in such a short time has quality considerations. Herring roe is popular during the new year in Japan [30].<sup>9</sup> Thus while herring roe must be processed in line with the spawning season, the concern over getting this high value product to the Japanese market

tends to override consideration for other products that could result in a better usage of the harvest.

Because herring are harvested just prior to spawning, the roe in the females reduces the quality of the fillets. One buyer stated that there was a strong market for food herring now (Respondent 15), and it was generally agreed that harvesters should be exploring food markets as a way to attain higher profits.

Another factor reducing the quality and value of herring is an oversupply of fish. Generally, both harvesters and processors felt that the quantity of fish being caught is too high. As a result of the timing of the spawning cycle, there is a specified window in which the quota of herring must be caught. However, there are several issues pertaining to the rate at which the herring is being fished and supplied to the processors. In the 16F management zone, herring first appear in the Pictou area resulting in the annual commencement of fishing activities in this location; easterly harvesters, sail to this area to catch their fish. This results in a high supply of fish to the processing sector in a short period of time.

As a consequence of the high volume of fish being taken on board fishing vessels (up to 20,000 lb per trip), quality is reduced as a result of compression from the weight of the fish. Damaged or bloodied roe and a lower price for product are the result. Because of the number of boats landing at approximately the same time, harvesters wait several hours to unload their fish for processing. This results in unnecessary spoilage. The problem is compounded by poor slushing (similar to the use of snow) and icing practices on part of both harvesters and processors. The large volume of fish being supplied to processors in a short time frame results in an oversupply of herring, leaving processors with more fish than the market demands.

Good icing and slushing practices are vital to ensuring a high-quality product; however, a lack of standardization and implementation exists in this fishery. Slushing of herring on the vessels in the southern Gulf is not commonplace, nor is it required. If herring harvesters are to take extra time and cost to ice the herring, and make structural changes to their vessels, they feel that there must be incentives in the form of increased prices. Desjardins [12] notes that attention to quality controls is often overlooked by some harvesters who negotiate higher herring prices from buyers in exchange for buyers getting access to more lucrative shellfish harvests.

<sup>9</sup>In the next subsection, we discuss in more detail the product and pricing differentiation for herring roe in the Japanese market.

Processors and buyers neglect proper slushing practices. Several harvesters commented that the processors are more focused on quantity than quality, often reducing the amount of ice in storage containers. This practice increases the amount of herring received, but also reduces the quality. Modes of transport and incurred handling practices reduce the quality of the product. One buyer commented that 80% of herring landed in 16F is trucked to New Brunswick with little or no ice in overloaded containers, resulting in a poor-quality product (Respondent 7). A processor commented on an incident several years ago when 14 tractor trailer loads of herring spoiled and went to waste while waiting to be processed (Respondent 15). This case illustrates the significance of icing, slushing and timely landing practices to maintain the quality of the herring.

It is difficult to determine who is responsible for implementing slushing and icing practices within the fishery; this dilemma was also reflected during the interviews. One harvester and GNSHF member stated that to solve the problem of icing "...buyers [must] demand a better quality" and that if this occurs "...harvesters will have to follow suit" (Respondent 7). Another processor, however, stated "...[i]t's hard to get it [slushing] when others are buying it [herring] uniced, fishermen must demand it [slushing]" (Respondent 15). What are the consequences of these practices for the prices secured in the Japanese market?

## 6.2. "Fishing for dollars": buyer-driven commodity chains and the Japanese market

Canada plays a minor role in the global herring industry. Between 1991 and 1999, the nation's share of frozen production fell from less than 7% to less than 2% of the global total, the share of cured production averaged from 11% to 12% and the share of prepared and preserved production averaged from 3% to 4% of global production. Canada's share of the overall value of herring exports fell from just under 6% of the total value of 416,200,000 (US\$ million) in 1991 to less than 4% of the total value of 555,400,000 in 1999. Although the value of exports fluctuated over the course of the decade, Norway, the Netherlands and Denmark remained as the top producers [12].<sup>10</sup>

Despite Canada's marginal role in overall herring trade, it is the largest exporter of herring roe to the Japanese market. In 1991, Canada (all provinces) exported over 61% of the total herring roe (17,800 tonnes) consumed in the Japanese market; while this fell to just over 51% of the total (9100 tonnes) in 1999, Canada was still the largest exporter of roe to Japan [12].<sup>11</sup> In 2000, Nova Scotia exported 1816 metric tonnes of herring products to Japan

mostly in the form of roe, accounting for \$12.7 million from Japan [8].<sup>12</sup> In terms of Japanese fish imports in 2001, herring roe products accounted for just over 1% of the total volume of fish imports and less than 1% of the total value [31].

Although Nova Scotia's (Gulf and Maritimes regions combined) herring fisheries secured the greatest landings in Canada over the past three decades, the much smaller volume from British Columbia during the same period received much greater value in the market [12]. This is largely attributable to the Japanese preference for the higher quality roe from that province. Table 3 provides data on the Japanese market for herring roe products from 1995 to 2001. Three trends are present: first, Canadian herring roe exports to Japan fluctuated during this period; second, the price per kilogram (Japanese Yen) for all roe products declined; third, the smaller volume roe on kelp received more than the salted and frozen roe products. The latter is produced by First Nations in British Columbia. This fishery depends on the spawning of herring roe on kelp beds [32].<sup>13</sup>

In contrast to other roes, herring spawn-on-kelp does not have to be extracted from females and is less likely to be damaged due to the weight of harvested males and females in fish holds and trucks. However, this is a lower volume fishery than the salted and frozen roe products secured by non-Native harvesters in Eastern and Western Canada. These products are further processed in the Japanese market. In recent years, there has been a transition away from the use of herring roe as expensive gifts for the new-year towards the use of this product as an 'ordinary consumer item'. Furthermore, traders are exploring ways for promoting the year round consumption of herring roe [31]. The latter is flavoured roe which is a typical end product for Eastern Canadian herring; however, to date, 1-year's production can be used for 2 market years. Added to this is the declining level of exports and prices. This roe is converted into flavoured roe favoured by younger Japanese [12]. Factors such as this ensure a low purchasing price for Japanese importers and limits the benefits producing communities could attain through processing such as employment and increased product value.

The Japanese influence in the seafood chain is, in part, responsible for the inefficiencies this fishery has witnessed over the past 30 years. Producers are pressured to produce herring roe in a 'timely manner'. This compromises the production of high quality.

Over the past decade, the price of herring continually declined as quotas have increased [11]. This challenges the entire existence of the fishery. Many fish harvesters feel

<sup>12</sup>These data mean that Nova Scotia's 2001 export total was over one-third of the total 1999 Canadian volume of herring roe exports going to Japan.

<sup>13</sup>For an analysis of the herring roe spawn-on-kelp fishery and its importance to Canada's west coast First Nations, see [33].

<sup>10</sup>These data are based upon the statistical information in Appendix B of Desjardins [12].

<sup>11</sup>Ibid.

fundamental changes in the fishery need to take place concerning the marketing and value of herring, both of which are directly related to the quality of the herring that is being sold by fish harvesters. “We need to be fishing for dollars, not pounds” was a statement made by a number of fish harvesters and processors alike.

‘Fishing for dollars’ captures the essence of a ‘buyer-driven’ commodity chain where local producers must in effect bend to the buyers’ demands. Rather than fish harvesters having a goal of catching a certain quantity of fish, they need to be fishing for money. This approach would prove to be in the best interests of not only fish harvesters and industry, but would also benefit the fish resource being exploited. With prices continuing to fall, this is no easy task. When comparing Japanese quality demands with the methods of production seen in the southern Gulf fishery, it is not surprising that the price for roe has continued to decline in the recent years. As competition among global food commodities continues to increase, positive quality attributes are necessary to secure a strategic position within the Japanese market.

The challenges of single-market reliance may also be partially resolved though the development of new herring products perhaps marketed for niche Japanese markets in urban centres such as Toronto and Vancouver. This strategy would reduce the vulnerability to changes in Japan, and provide for more efficient use of this valuable natural resource. Clearly, there must be a legitimate response from both Canada’s DFO and industry stakeholders to develop policies to effectively improve the state of this fishery. To that end, what are the implications of the current direction in fisheries management for the herring roe fishery?

### 6.3. *The DFO, ITQs and the future management of the herring roe fishery*

Since the introduction of limited entry licensing in the early 1980s, state imposed regimes gave way to the first signs (at least at a rhetorical level) of more collaborative decision-making in the form of co-management. Harvesters are developing and expressing their own ideas about approaches to management, calling for the much needed consideration of their input before the development of policy. A recent direction includes Integrated Fisheries Management Plans (IFMP) introduced by the DFO in the mid 1990s. The overall aim is to “...incorporate conservation, management and scientific requirements for a fishery and also spell out the process and implementation of resource management, conservation and protection measures ...provid[ing] the basis for a more integrated approach between DFO sectors, as well as for a more meaningful participation of all stakeholders...set[ing] the stage for co-management” [34]. The most recent IFMP review for the herring fishery in the southern Gulf of St. Lawrence noted that many harvesters felt that co-management also meant the implementation of ITQs [35]. A

Table 3

Canadian herring roe export volume (tonnes) and value (Yen) to the Japanese Market, 1995–2001

Herring roe export	1995		1998		2001	
	Tonnes	Yen/kg	Tonnes	Yen/kg	Tonnes	Yen/kg
Salted roe	3913	2220	5095	1785	4264	1895
Frozen roe	4364	699	3148	423	4011	621
Roe on kelp	303	5236	474	2393	507	2222

Source: Agriculture and Agri-food Canada [31].

neglected consideration by DFO is the degree to which current and future management plans account for the existence of ‘buyer-driven’ markets.

A representative from the GNSHF felt there was an indication that an ITQ system may be a future management measure for herring in the southern Gulf. Since its inception, the GNSHF has collaborated with DFO in the scientific estimation of herring stocks, and in the development of IFMPs for this fishery. While the GNSHF favoured the current direction of the IFMP, he indicated that the biggest problem is the underutilization of the herring (Respondent 7). This suggests that management issues aside, the real power lies with the Japanese given that they ‘drive’ the nature of resource utilization. A fisheries consultant suggested an ITQ system could effectively address inefficiencies within the fishery regarding the low quality and low value of the fish. When addressing the low price of herring attained by fish harvesters, he felt that ITQs could provide ‘market leverage’ to quota holders when dealing with buyers, as they can then choose not to fish if the price is too low; in effect, developing a sellers’ market.

The critical question is that if ITQs are to become part of future IFMPs in the herring fishery, will there be limits on transferability at individual, community and regional levels?<sup>14</sup> Fewer fish harvesters operating with ITQs may promote increased participation between sectors to address current handling practices, roe quality, and reduce the current amount of resource waste in the fishery. Given the globalization of food exports and imports over wider distances, importers usually prefer dealing with fewer

<sup>14</sup>This discussion of ITQs should not be seen as the authors’ endorsement of this policy approach; however, given the growing international preference for ITQs, our position is staked out by considering the limitations of property rights efficiencies when looking at the implications of long-distance trade. A further analysis of any ITQ policy in the herring roe fishery also demands consideration of community-based impacts, regardless of the property rights regime that is in place.

Apostle, McCay and Mikalsen noted for the midshore groundfish fleet of Nova Scotia there may be a balance between ‘economic efficiency’ and ‘environmental sustainability’ with the promotion of ITQs because a dockside grading system ensures quotas are being adhered to. They also note that with ITQs divisions emerge in coastal communities over equity issues, especially in the debate over how much quota should reside in the hands of any one individual [13].

suppliers thereby ‘potentially’ promoting economic concentration further upstream in global food chains.

If an ITQ fishery for herring roe is developed, will greater control for harvesters ensue? Will ITQ harvesters be able to use their property right to decide when to harvest herring roe, especially if the conditions of high quality and rapid production demands remain, albeit for a diminishing market? What restrictions will be given to the amount of quota initially given to harvesters and to the transferability of a quota from one individual to another on both community and wider regional levels? Desjardins [12] notes the allocation of quotas on the basis of ‘historic catches’ alone will not be efficient given that a quota reduction may be necessary in any long-term drive towards better quality in the herring roe fishery. What if quota reductions still result in production above what is needed for the Japanese market? Since many herring roe harvesters also participate in the lobster fishery, will an ITQ system make a difference if the strong Canadian dollar impedes lobster exports to the American market? In other words, will the price demanded by the Japanese have to be accepted to even a greater extent in the future than it is now? A revamped system of property rights along the lines of ITQs may mean that the resource inefficiencies of the herring roe fishery will be reproduced. Fisheries management policies need to take greater account of the impact of the ‘global’ on the ‘local’.

## 7. Discussion and conclusions: implications for policy

Industry stakeholders need to develop an effective response to Japanese market demands. Our interview data show that enhancing the quality of the roe can be accomplished by: improving onboard and dockside handling practices by implementing slushing and icing, reducing the quota, extending the season, fishing later in the year, limiting the amount of herring being stored in shipping containers, ensuring adequate icing of herring prior to transport, ensuring the timely processing of the herring and reducing the daily trip limit.

Alternative markets for herring products would reduce the level of reliance on the Japanese market, and would promote the production of higher value herring products. Products such as fillets, or value-added specialty items, would also likely receive higher prices than the current fishmeal that is most often produced with the ‘excess herring’ left over after roe extraction. Such a change would decrease the vulnerability of local producers, and give the local industry increased leverage within global markets. As noted earlier, the Norwegian herring industry has access to a number of markets ranging from the salmon feed industry to the fresh fillet markets in Eastern Europe [5]. Of course, geographical proximity makes a difference, but as we indicated above, niche markets in North America should be explored in order to reduce reliance on long-distance exports to Japan. In addition, the diversification of export markets should be explored; the fresh and frozen fillet market is more lucrative in Eastern Europe than what

currently exists in Canada. Nevertheless, limitations such as the cheaper price of the product secured from Eastern European members of the EU (such as Poland), EU market restrictions and the power of the large Norwegian industry are factors in need of consideration here.

Buyers and processors feel that there needs to be a better understanding of the stages within the entire commodity chain. Some buyers commented that they did not know what products were developed with the herring they sold to alternative processing companies. This certainly creates difficulty for buyers, processors and harvesters to maintain quality standards throughout the production stages when the end product is unknown. It is evident that increased market awareness is needed, as the industry cannot be expected to adequately respond to market demands when the involvement and linkages of understanding within the production, buying and processing stages are so severed in the Canadian market.

Improved supply chain integration is necessary in the herring roe fishery [12]. Harvesters, processors and buyers need a more coordinated approach in the delivery of information throughout the part of the supply chain that is locally controlled. In the face of competition among harvesters, processors and buyers, this may appear as an elusive and romantic goal, but the alternative is no longer sustainable. Research on industrial clusters in other natural resource industries has shown that an improvement in the ‘learning curve’ within an industry is conducive to the long-term viability of the industry [36]. Supply chain integration can improve the knowledge of higher priced market alternatives for herring products, and perhaps even access to ‘knowledge’ of preferences for herring roe among Japanese-Canadians. Successful supply chain integration may enable harvesters, processors and buyers to compete less amongst each other and be better positioned to compete against others in gaining access to herring markets. A shift towards ITQs under existing conditions will not improve the situation. If the Japanese are able to dictate price, and actors in the local supply chain continue their uncoordinated approach to their main market, the property rights regime in place will make little difference in providing more benefits to local communities.

Co-management has not yet been fully established within this fishery, and as such, DFO must still take responsibility to address these issues which are both negatively affecting the resource and the economic security of these coastal fishing communities. Because the DFO is responsible for the management of the Canadian marine environment, it aims to “...foster the protection, conservation, and sustainable use of fisheries resources” [34]. The DFO is not responsible for the sustainable use of the resource once it enters land-based processing; yet, decisions on land (in Canada and Japan) influence decisions governing the harvesting of the resource. The stocks may be biologically sustainable, but issues of economic viability are called into question. The DFO cannot control the decisions preferred by land-based processors and other actors in the supply

chain, but as Desjardins [12] notes the DFO can control the quota; furthermore, it can control the length of the season. If the available product enters the supply chain in lower quantities and over a longer period of time, local harvesters can maximize more value from the resource. Lower quotas, of course, need to be considered against the context of current quota divisions between mobile seiners and fixed gear inshore vessels. A future scenario that provides greater distributions in favour of the mobile seiner fleet will only exacerbate inequalities in coastal settings, especially given the reduction in fishing options that have followed the post-1992 groundfish moratorium in significant parts of Eastern Canada.

The case of the southern Gulf of St. Lawrence herring fishery and the obvious dilemmas present illustrate the significant relationships between the local industry and the Japanese market. Such linkages among these sectors must be given attention when developing appropriate fisheries management strategies. The DFO and industry stakeholders must find ways of developing and implementing adequate policies to improve the efficiency and economic viability of the fishery. Such gains would be needed to ensure that this valuable resource, as well as the unique coastal fishing communities who rely on it, are both sustainable and resilient for many fishing seasons to come.

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