Section 7 — Other Issues

7.1 Roadside Fish and Seafood Sales

How to interpret the Legislation for Application to Roadside Sales

The *Public Health Act* and *Fish Inspection Act* provide for inspection of all places where fish intended for human consumption is processed or sold.

During inspection, if fish (or foods) are found that appear contaminated or unfit for human consumption, the product may be seized and held under Section 8 of the *Fish Inspection Act* or Section 32(2) of the *Public Health Act*. Under the *Fish Inspection Act* foods for examination or inspection that meet prescribed standards must be returned to the owners. Foods that are contaminated or unfit for human consumption may be condemned by issuance of an order to the owner.

Does a roadside vendor require a license?

Roadside vendors selling fish or other seafood from a van (or other roadside conveyance) should be obtaining (purchasing) fish from an approved source, and must be able to provide documentation to this effect. Roadside vendors don't need a license to either purchase or sell fish (there is one exception, explained below). If an operator cannot prove the source of the product, the EHO may ask the operator to destroy the product.

Approved sources include:

- All fish must be caught under the authority of a licence that authorizes sales.
- When the fisherman is a roadside vendor and the fish come from his own validly licensed fishing vessel, and he is selling his own catch (e.g., a fisherman with a fish vending license).
- Purchase from a business that has a legitimate license and where fish have already gone through a provincially registered plant, including
  - fish processor with fish processing license, or
  - cold storage facility where fish have been obtained from an approved source.
- Purchase directly from a fisherman. In this exception, the roadside vendor will require a fish buyer license to transport the fish. The vehicle must comply with all provincial regulations.

Approval of Roadside Vendors

Operators selling fish in a mobile unit (motorized or non-motorized conveyance) DO NOT require a license from MAGRI, but DO require approval from their local Health Authority. Operators should submit for approval the plans and specifications of their mobile unit to the local Health Authority where they will operate. The operator must receive approval of the plans and specifications from the Health Authority before the fish are sold. Applications will be reviewed by the Health Authority.

Note

Implementation of these guidelines and regional requirements may vary between Health Authorities.

Regional Differences for Roadside Fish and Seafood Sales

Fraser HA: Mobile fish vendors are required to submit an application and a business plan to FHA and obtain approval before commencing operations. An inspection of the vehicle will result in an inspection report. On request, a letter of approval will be issued by the EHO/HA to the operator (No permits or licenses issued) [1].

Interior HA: Mobile fish vendors operating inside of city limits will be required to obtain a business license (dependant on municipal by-laws). Operators without business licenses may be subject to visits by bylaw enforcement. An inspection by the EHO will result in an inspection report, the operator gets a copy [2].

Northern HA: An inspection will result in a file listed in Healthspace; approved mobile fish vending units are listed. No permits or licenses are issued [3].

Vancouver Coastal HA: Mobile fish vendors are required to submit an application to VCHA for review and approval. An approval must conform to Policy 97-3, food regulations and any local policies or bylaws. The approval notice must be posted in the vehicle [4].

Vancouver Island HA: Mobile fish vendors may require a business license. Fish must be from an approved source. Where only unprocessed frozen product is being sold, inspections are on a complaint basis. Any processing will require compliance with the VIHA Mobile Food Facility Guidelines [5].

What should inspectors look for when inspecting roadside vendors?

1. Documentation and Illegal Product

Operators must be able to produce documentation that fish was purchased from an approved supplier.

This can take the form of invoices or fish slips. All shellfish MUST have a traceable shellfish tag to verify inspection through a federally registered plant. Invoices and shellfish tags should be current and dated within one to two weeks of fresh product sales. Volumes on invoices should roughly match the volume of product and sales receipts on hand. If any of this is not in evidence, and sources appear suspicious, health inspectors should phone MAGRI and/or DFO inspectors to assist with further investigations. Further details on recognizing illegal product is given in Section 2.

2. Fish Quality

Fish that are frozen must be kept at temperatures at -18˚C or below using mechanical refrigeration.

Fresh fish, packed into ice must be kept at or below 4˚C, preferably with mechanical refrigeration, although ice in coolers can be acceptable. Ice must be food grade. Operators should be able to demonstrate that temperatures are being monitored AND recorded.

3. Sanitation

A two compartment sink, and a separate handwash sink (with hot and cold running water, soap in a dispenser and single use hand towels) are required. If minimal equipment is used (ie, only dispensing tongs) a separate handwash sink may be waived.

More details can be found in the *"Guideline for the Construction and Operation of Mobile Fish Vending Units"* in Section 8 [6]

What about further processing?
When is a Fish Processing Licence Required?

What about when the person selling fish engages in further processing? This might include steaking of the fish for fresh or frozen fillets. At what point does this require a fish processing license? A processing license may be required depending on how much primary processing is done, where the fish is caught, even if the fisherman has a vending license.

According to the *Fisheries Act and Regulations,* ALL further processing should be done at a licensed provincial or federal plant, and this practice is not allowed.

If the roadside vendor wishes to engage in these activities his vehicle must be inspected, licensed and comply with all regulations pertaining to the Fish Inspection Regulation as it relates to fish processing facilities.

7.2 Fish Sales at Docks

Responsibility to Inspect Boats or Float-Homes Selling Fish at Docks

The responsibility to inspect fish sales occurring on boats or float-homes on a dock lies with the inspectors at BC Ministry of Agriculture (MAGRI) and Department of Fisheries and Oceans (DFO).

Fish Sold by Fisherman

Under a fish vending license, a fisherman may bleed and gut his catch "at sea". The fish can be sold directly from his boat, or from another conveyance, such as a vehicle. If the fisherman sells from his vehicle, the vehicle must still comply with all provincial regulations, the *"Guideline for the Construction and Operation of Mobile Fish Vending Units"* [6], the local Health Authority requirements and any other municipal and regional requirements (ie. business license). If the fish are eviscerated at the dock or in the harbor, there is a requirement for the fishermen to obtain a **Provincial Fish Processing License**. This operation would be both inspected and licensed by MAGRI.

Responsibility to Inspect Other Retail Operations at Docks

Sales of fish and seafoods at public docks by fishermen vending their own product may occur on the same dock beside food retail premises. These food retail premises can range from the sale of portioned filleted fish to fried fish and chips. The following provides some guidance regarding jurisdiction.

Fish Sold by Retail Store (direct sales only)

If the premise at the dock is operating like a retail store (sale of raw fish, sale of fish from live holding tanks, eviscerating live products, filleting, icing/freezing) with direct sales at the location but no wholesale distribution the premise is inspected by the Health Authority. The retail store can either apply for a food premise permit under the *Public Health Act — Food Premises Regulation*, or a Fish Processing License under the *BC Fisheries Act*, Section 13(1). The premise must be able to provide documentation that they have purchased fish from an approved source.

Fish Sold by Retail Store (wholesales)

If the premise is engaging in preparing fish for wholesale distribution to other stores, restaurants or door-to-door sales a Fish Processing License is required. This operation would be inspected by the Health Authority under the *BC Fish Inspection Act and Regulation*, and licensed by MAGRI.

Fish Sold from Food Service Establishment (restaurant, take-away etc.)

If the premise at the dock is operating like a food service establishment (e.g. restaurant) the premise is inspected by the Health Authority under the *Health Act — Food Premises Regulation*.

If the premise is operating like a food service establishment AND manufacturing products for distribution they require an operating permit pursuant to Section 8 of the *Food Premises Regulation* (BC Reg. 210/99) and a separate Provincial Fish Processing License from MAGRI under the *Fish Act and Regulations*. The premises would be inspected by the EHO.

The differences between food service establishments, retail sales and processors is outlined in Section 2 Table 2.

History that set precedent for dealing with fish sales at docks:

In 1987 concerns about the role of government agencies at the Steveston Public Dock regarding the sale of fish was raised by fishermen (industry). A notice was circulated to industry that outlined the jurisdictions at the dock — the following information is taken from this notice. The agencies identified in this notice included:

- The owner and operator of the dock (DFO, specifically Small Craft Harbors)
- DFO, License Division
- DFO, Fisheries Enforcement Division
- DFO, Inspection Service
- Health Authority (Richmond Health)
- MAGRI (formerly known as MAFF)

Richmond Health Department recognized MAGRI as the lead agency responsible for regulating fish sales at the Steveston dock.

> "The Health Department, being responsible for the protection of health and safety in the general public, will only carry out inspections if there is a clear health hazard present and no-one is available to respond to the complaint."

Based on this decision, Table 30 outlines the roles and responsibilities of all the various agencies.

Table 30 — Agency Responsibilities at Fish Docks

	DO	DON'T
DFO – Dock owner /operator	• collect moorage fees (under *Fishing and Recreation Harbors Act*) regulate activities to ensure safety of other vessels & harbor structures	• license vessels for sale of fish
DFO – Licencing	• license fishing & packing vessels (under *Fisheries Act* – Canada)	• license vessels as fish vendors
DFO – Fisheries Enforcement	• enforce Federal regulations relating to all sport, aboriginal and commercial fisheries (for eg, check for illegally caught fish) • have ex-officio status to enforce *Provincial Fish Inspection Act & Regs* • have ex-officio status to enforce *Provincial Wildlife Act & Regs*	• normally enforce regulations re: fish sales or product quality
DFO – Inspection	• inspect fishing vessels • inspect any place, vessel, vehicle, premise or container • have ex-officio status to enforce *Provincial Fish Inspection Act & Regs* • aquaculture	
HA	• inspect if a clear health hazard is present • respond to complaints if no-one else is available	
MAGRI	• license fish vendors and regulate sales of fish	• inspect retail food premises or provincial fish processing plants

7.3 Fish Processing of Sport Caught Fish at Fishing Lodges

Responsibility to Inspect and Certify Sport Caught Fishing for Processing in Fishing Lodges

The responsibility to inspect and ceritfy sport caught fishing for processing at fishing lodges lies with MAGRI. Fishing lodges include land-based operations and float-homes.

Other areas of responsibility in reference to float-homes (not covered here) include:

- Permits for drinking water, food premises, communicable disease reporting, sewage, recreational water (responsible agency: Health Authority)
- Permits for fuel storage, spill response capacity, solid waste disposal, sewage (responsible agency: Ministry of Environment)
- Permits for foreshore leases, licenses of occupation (MAGRI).

Sport Caught Fish and Fish Processing

Many fishing lodges clean, freeze, and store the catch of their clients. They may also serve the fish (cook it) for their clients.

A review of whether sport fishing lodges should be licensed as processors has been identified in a draft briefing document at MAGRI. All canning of fish must be done in a licensed federal facility. Sport lodges may send client's sport caught fish for canning. Other processing activities that occur at the fishing lodge, such as cleaning, freezing and dressing do not represent a large public health and safety concern. Smoking, and subsequent packaging and storage, however, would represent a processing activity of public health and safety concern. Although this issue has not been finalized, some level of licensing when significant health and safety concerns associated with specific processing practices exist are recommended.

At this time, sport fishing lodges that clean, freeze and/or dress the catch of their clients **do not** need to be licensed as a processor.

What Inspectors Should Look For When Inspecting Retail Premises on Docks, or Fishing Lodges

The sale and processing of fish at docks and fishing lodges are largely under the regulatory oversight of MAGRI (or CFIA, for canning). If EHO's are inspecting these premises (possibly for other reasons) and they notice any activities or conditions that appear suspicious, they should bring this to the attention of their local MAGRI or CFIA contact.

These may include:

- Illegal species found in fridge or freezer
- High risk processing activity (such as smoking or canning) occurring on fishing lodges
- Suspicious "sales" of fish, in or out of premises

Can fishing lodges cook and serve personal catch?

In fishing lodge restaurants (on float-homes or on land) the general consensus among Health Authorities is that cooking of personal catch is only permitted if the fish comes from an approved source (under Division 3.11.a of the *Food Premises Regulation*). However, the health risk to the public of serving fresh caught fish (if properly handled) is very low, and there is little difference between fish inspected at a fish processing facility, or cleaned and gutted by the fishing lodge guide at sea or at dock. Health Authorities may decide to allow this practice in special circumstances by approving the fish source as outlined in *Food Premises Regulation* Division 3.11.b. Fishing lodge food service establishments are inspected by EHOs. Travel to remote sites may need to be arranged with MAGRI and/or DFO inspectors.

Existing Processing and Packaging Requirements for Fish that Clients Take Away with Them

For personal catch, DFO has a brochure called “Package your Fish Properly for Transport”. Under the Fishery (General) Regulations Section 36 there are guidelines for transporting personal catch. All packages of fish must be prepared in such a manner that the fish can be identified, the count or number of fish can be determined, and for fish that have catch limits dependent on size or weight, that the measurement of the fish can be taken (head and tail must stay one) and the weight can be determined. For further information see the DFO web-site link at http://www.pac.dfo-mpo.gc.ca/fm-gp/rec/points/packaging-emballage-eng.htm or for the whole sport fishing guide see http://www.pac.dfo-mpo.gc.ca/fm-gp/rec/SFG-GPS/SFGtidal-GPSmaree-eng.pdf

Many clients want to take their catch home with them. If they live outside of Canada they may require a health export certificate. The European Union is requiring sport fish health certificates if the shipment exceeds 20kg in weight and is being exported for personal consumption. On request, the CFIA will issue a certificate with the fish (usually canned, smoked and packaged) that will allow the fish to be taken out of country. As long as the fish processing facility used by the sport fishing lodge is federally licensed there is no issue of concern with this practice.

FROZEN FINFISH ONLY: In the past, sport fishing lodges were required to send the fish away to a licensed federally inspected facility fish processor (usually in small commercial lots) that would be treated as a commodity and a CFIA certificate would be issued. In 2007 MAGRI and CFIA implemented a MOU to allow certification of sport caught fish at the sport fishing lodges. Under the terms of this new agreement MAGRI staff are designated as CFIA inspectors. CFIA provides an “EU List No.” for “SFL” (sport fishing lodges). The blank certificates are given to the sport fishing lodges for EU clients wishing to take home frozen, eviscerated, cleaned and packaged fish. Sport fishing lodges must comply with the GMPs and operational requirements as outlined in the MOU. MAGRI inspectors must inspect and ensure these facilities meet the requirements outlined in the MOU.

If the clients live in Canada, sport fishing lodges that clean, freeze and/or dress the catch of their clients **do not** need to be licensed as a processor. Sending clients home with whole fish (ungutted) should not be permitted due to the increased health risks associated with uneviscerated fish. If the fishing lodge is engaging in smoking and further processing on behalf of clients, then MAGRI would need to evaluate the operation on a case-by-case basis to determine if a license was/is required.

Another issue that may arise is “banking “of fish, when a previous catch of a similar species made by a prior client is given to the current client. This is done as processing (inspection, canning and smoking) may take too long before the client’s departure from the lodge. This is mainly a concern for DFO. They oversee conservation (protection of the wild fishery resource), and seek to prevent illegal catch that may occur with the banking of fish practice.

7.4 Special Events and Farmer's Markets

Special Events

These types of temporary food operations and events can be categorized as

- Block parties
- Chef demonstrations
- Industry events (eg. open outdoor BBQ for public)
- Fairs (eg. PNE)
- Festivals (eg. Oyster festival)
- School events (eg. Casino night)
- Special community events (eg. Hospital fundraiser, Greek festival)

Some of these events may be serving raw fish, ie. sushi or oysters, fish that will be cooked, ie. salmon or crab or have ready-to-eat foods to be served on site. Foods may be prepared on-site or elsewhere and transported to the event.

In all cases these scenarios will require a temporary food service permit from the designated Health Authority. The Health Authority will determine whether the food is high risk and what conditions must be met before sale. The legislation EHOs operate under in this case is the *Food Premises Regulation* and *Public Health Act*.

Foods served at these events **must** be from an approved source. For example, at the Oyster festival, shellfish must be inspected at a federally registered plant and subject to all *Fish Acts and Regulations* before service to public (whether or not they are sold). The shellfish must have a legitimate shellfish tag.

Farmers Markets

Fish products sold at a farmers market should comply with the *"Guidelines for the Sale of Foods at Temporary Markets"*, [7] the most current copy is on the BCCDC web-site

> At this time, the sale of fresh raw animal protein (ie. fresh fish, fresh shellfish, fresh chicken, fresh sausage etc.) is **not recommended**.

Other cooked seafoods for sale will be assessed according to the Guidelines above and current GMPs. All cooked seafoods offered for sale must be from an approved source. This means (for example) that smoked salmon should be processed in a provincially licensed plant (the owner of the plant would have a verifiable salmon processing license). Unlicensed (ie. home) processing of fish that are offered for sale to the public is not allowed under the *BC Fish Inspection Act and Regulations* (FIR Section 12.1).

7.5 First Nations Fish Processing and Sales

Do First Nations fish processing plants require a provincial inspection?

First Nations (FN) who are processing fish for sale within the Province of BC are subject to the *BC Fish Inspection Act and Regulations* to be licensed and inspected, as would any other plant in BC.

When is a First Nations Plant inspected federally (by CFIA)?

- If the FN plant is exporting product outside of the province,
- If the FN plant is canning or retorting fish, and
- If the FN plant is processing bivalve shellfish.

These plants would, in addition to *BC Fish Inspection Act and Regulations*, be subject to the *Federal Fisheries Act and Regulations*, and would be inspected by federal CFIA fish inspection officers.

Who is responsible for retail sales on First Nations lands?

Routine health inspections of retail stores, restaurants, vendors and other venues on First Nations lands are the responsibility of federal Environmental Health Officers.

Table 31 — Contact List for Federal Health Canada Environmental Health Inspectors in BC for First Nations Issues

Position	Name	Address	Phone/Fax	E-mail
Regional Manager, BC and Lower Mainland	Richard Lawrence	404,1138 Melville St Vancouver, BC V6E 4S3	P: 604-666-7313 F: 604-666-3356	richard.lawrence@hc-sc.gc.ca
Fraser and Interior HA	Ian Mclean	985 McGill Place Kamloops, BC V2C 6X6	P: 250-851-4831 F: 250-851-4838	ian.mclean@hc-sc.gc.ca
Northern HA	Iain Baird	177 Victoria St Prince George, BC V2L 5R8	P: 250-561-5378 F: 250-564-3272	iain.baird@hc-sc.gc.ca
Vancouver Coastal and Vancouver Island HA	Peter Mazey	1230 Government St Victoria, BC V8W 3Y2	P:250-363-0249 F: 250-363-0179	peter.mazey@hc-sc.gc.ca

Note

Contact information for all federal staff can be found at the Government Electronic Directory Services

7.6 Land-based and Ocean-based Aquaculture (Farmed Fish)

Background

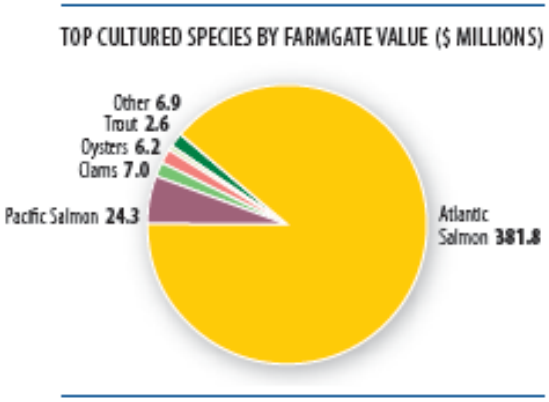
In the latest BC Seafood Industry Year in Review 2008 document, there were 788 aquaculture facilities in the province, and 233 processing facilities [8].

Aquaculture processing in BC is increasing and is a significant source of revenue. Wild salmon wholesale value was $135.2 million in 2008, while aquaculture value was much higher at $495.2 million dollars. Wild shellfish wholesale value was $151.4 million, and cultured was lower at $27 million dollars [8].

Processing can occur either in ocean waters or on land. Land-based aquaculture products in BC include farming of trout, tilapia and white-leg shrimp. The majority of ocean-based aquaculture is with Atlantic and Pacific salmon, other species include clams, geoducks, mussels, oysters, scallops, marine plants, sea cucumbers and sea urchins.

British Columbia Aquaculture Licences by Culture Type 2008

Operation Type (water- & land-based combined)	Number of Licensed Operations	Actively Cultured Species
Marine Growout		
Salmon & Other Finfish	133	4
Shellfish	494	10
Marine Plants	9	3
Freshwater Growout		
Salmon & Other Finfish	80	12
Shellfish	2	1
Marine Hatchery		
Other Finfish	4	1
Shellfish	10	6
Freshwater Hatchery		
Salmon & Other Finfish	56	10
Shellfish	1	1
Total	**788**	**30**

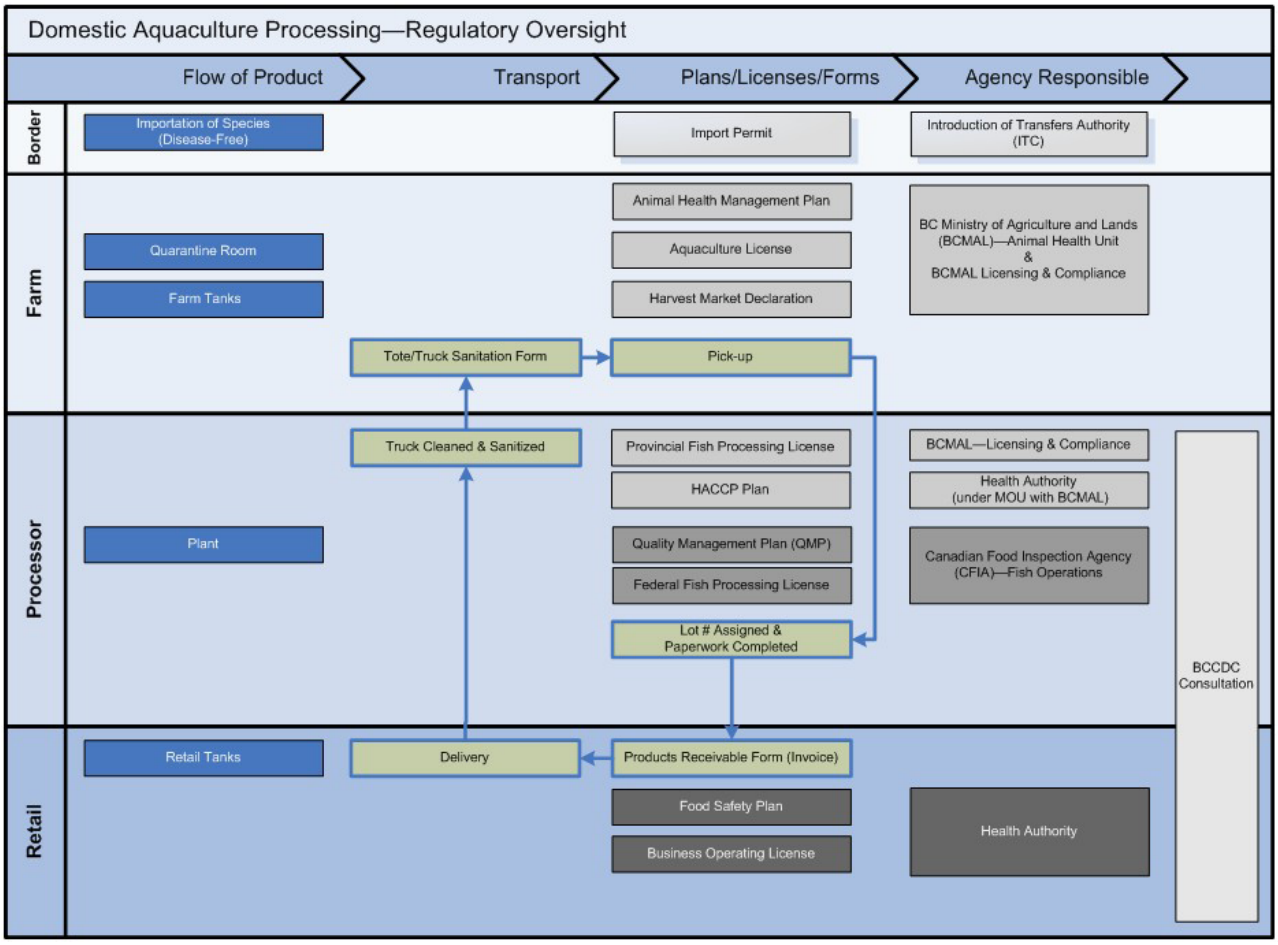


In 2008, 90,900 tonnes (36 per cent) of British Columbia's seafood was produced in culture facilities – a slight increase from the previous year's 89,800 tonnes.

The operations generated a farmgate value $428.9 million – 5 per cent higher than the $410.4 million reported in 2007. The aquaculture sector made up 60 per cent of the total landed value of British Columbia seafood.

Land-based Aquaculture

A multi-agency meeting was held in March 2009 between Federal agencies which included the CFIA — Canadian Food Inspection Agency; DFO — Department of Fisheries and Oceans; Provincial agencies: MAGRI — BC Ministry of Agriculture; MOE — Ministry of Environment, BCCDC — BC Centre for Disease Control and Regional Health Authority Environmental Health Officers to review actions and activities of all agency stakeholders regarding land-based aquaculture processing for a specific farm. The major safety issues and roles between the agencies were reviewed, and charted out. The regulatory oversight involved in domestic aquaculture processing is complex as depicted in the following chart.



Roles and Responsibilities of Various Agencies on farm:

MAGRI: Issue aquaculture licence to the farm. Animal Health Management veterinarians are concerned with the animal health issues. Once the animals arrive at the farm under quarantine the Animal Health Branch is responsible to work with the farm operator to monitor the health of the animals.

CFIA: CFIA is undertaking regulatory changes to create reportable diseases for aquatic animals in Canada. Currently there are none. CFIA does not have any authority to go on the farm at this time. The Chief Veterinary Officer of CFIA reports to OIE about reportable animal diseases.

ITC (Introduction of Transfers Authority): a joint provincial and federal committee currently responsible for granting import licences to animal species. Committee is made up of CFIA, DFO, MAGRI, and MOE.

HAs: Health Authority health inspectors have no regulatory oversight at the farm.

Roles and Responsibilities of Various Agencies at Processor:

MAGRI: issues Fish Processing licence under the *BC Fish Act and Regulation*. Inspect delivery vehicles on-site.

CFIA: issues registration under *Federal Fish Inspection Act and Regulations*, evaluates QMP plan for compliance and perform audits of the facility (including delivery vehicles and totes).

HAs: under an agreement with MAGRI as the licensing body, HA Health inspectors (EHOs) perform health inspections at the processor. They act as designated Fishery officers by taking the Fish Inspection Oath for this purpose. EHOs are not required to inspect federally registered facilities being inspected by CFIA.

Roles and Responsibilities of Various Agencies at Retail:

MAGRI & DFO: Conservation and enforcement branches may verify species at retail to ensure no illegal product is being sold or mixed in with aquaculture product.

CFIA: enact recall of product, if necessary.

HAs: issues business and food premise permit as appropriate, evaluates FSP plan for compliance and perform audits of the premise. If, during inspection, a delivery van is on premise inspect also.

Concerns regarding Aquaculture Product

- Cleaning and disinfection of the totes as an important biosecurity measure
- Disposal of waste-water and dead fish and dead invertebrates.
- Responsibility to inspect the vans as transport vehicles between the farm, processor and retail
- How to address concerns of disease or hazards at retail that may involve mixed operations of imported and domestic (aquaculture) product.
- How to recognize approved product in the marketplace
- Potential meat markets developing if product is not sold.
- Retail tank maintenance and cleanliness

The types of businesses linked to aquaculture products EHOs may be required to inspect include processors, delivery vehicles and retail. As outlined above and in the chart, EHOs have no regulatory activities on aquaculture farms. The information provided below regarding processors will largely be dealt with by CFIA and MAGRI inspectors and is provided for reference.

At the Processor:

- EHO's should be aware of a MAGRI form that accompanies product from farm to processor in the delivery vans called the Harvest/Market Declaration Form. Current BC Aquaculture regulations require all cultured finfish to be processed in a federally registered plant to check for antibiotics (use of therapeutants). To address this MAGRI has introduced a Harvest/Market Declaration Form. EHO's are not required to inspect for these forms, this will normally be done by MAGRI and CFIA.
- Waste-water disposal and cleaning of totes and baskets should be made part of the QMP plan requirements. It is also recommended that since tote cleaning is such an important biosecurity measure, a specific form (as part of the SOP) be created (totes were cleaned before they come back to the farm to take on new product).
- Disposal of dead fish and invertebrates will be part of an Animal Hlth Mgt Plan and QMP plan. It is more of a concern for processors than the small volumes likely to be dead at retail.

At Retail:

- Disposal of dead fish and invertebrates into garbage for landfill, with destruction by bleach is satisfactory. Neither dead fish nor dead invertebrates culled from tanks should be sold at retail.

- Concerns of disease at retail by mixing of species — different types of aquaculture and wild product (ie. tilapia) should be separate. The salinity requirements will be different (imported tilapia requires freshwater; aqua-cultured tilapia requires a salinity of 15) so retailers could not mix species. Information about salinity, temperature etc. for aquaculture product held in retail tanks is included in the Retail Tank Holding Guidelines [9].
- Premises with multiple tanks should have a water supply consistent with the Retail Tank Holding Guidelines [9], and of special note, shellfish must have clean water and be upstream of any water supply shared by other species.
- If a disease or hazard occurred at retail that caused human illness, there is the possibility that the product would be put on hold (could not be sold). Any potential recalls of product would be the responsibility of CFIA.
- Delivery vans, if present during time of inspections, should be assessed for general cleanliness, temperature control of products etc.
- Documentation for species will be assessed by invoices.

7.7 Nutritional Benefits and Concerns Associated with Fish and Shellfish Consumption

Nutritional benefits of seafood consumption

Seafoods are an excellent source of omega-3 fatty acids. Omega-3 fatty acids are unsaturated fatty acids that have a carbon-carbon double bond 3 positions from the end of the methyl group [10]. Common omega-3's found in food include include α-linolenic acid (ALA) from vegetable oils, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), both from fish oils [10].

Nutritional benefits of fish oils include reduced risk of coronary heart disease (CHD), reduced risk of stroke, arrhythmias, reduction of blood pressure, heart rate, triglycerides, depression, aggression, suicide and improvements in infant cognition, verbal IQ, communication, social development and motor skills. Some of these have been well substantiated in numerous studies, others have less supporting evidence.

A recent literature review assessing the evidence of fish oil consumption on cardiovascular outcomes found strong evidence for the reduction of CHD and moderate evidence for the reduction of ischemic stroke (see summary table at right) [11].

Summary of evidence for effects of consumption of fish or fish oil on Cardiovascular Outcomes [11]

Outcome	Clinical Effect	Strength of Evidence	Comment
CHD mortality			
CHD death	≈ 35% decrease	Strong	Probable threshold of effect—most risk reduction occurs with modest intake (≈ 250 mg/d EPA + DHA), with little additional benefit with higher intakes[2-4,6-17,45-51]*
Sudden death	≈ 50% decrease	Strong	
Ischemic stroke	≈ 30% decrease	Moderate	Strong evidence from prospective cohort studies[53,54]; no RCTs
Nonfatal CHD			
Nonfatal MI	Modest benefit?	Equivocal	Possible benefits at very high intakes (≈ 2 g/d n-3 PUFAs)[17,50]
Progression of atherosclerosis	Modest benefit?	Equivocal	Mixed results in cohort studies[55] and RCTs[56-58]
Postangioplasty restenosis	Modest benefit?	Equivocal	Possible benefits in a meta-analysis of RCTs[59]
Recurrent ventricular tachyarrhythmias	Modest benefit?	Equivocal	Mixed results in 3 RCTs[60-62]
Atrial fibrillation	≈ 30%+ decrease	Limited	Mixed results in 2 cohort studies[63,64]; benefit in 1 RCT[65]
Congestive heart failure	≈ 30% decrease	Limited	Benefit in 1 prospective cohort study[66]

Abbreviations: CHD, coronary heart disease; DHA, docosahexaenoic acid; EPA, eicosapentaenoic acid; MI, myocardial infraction; n-3 PUFA, n-3 polyunsaturated fatty acid; RCT, randomized clinical trial.

In a study reviewing maternal fish consumption, higher fish intake was associated with improved infant cognition (measured as visual recognition memory) [12]. Another study was based on data collected during the Avon Longitudinal Study of Parents and Children (over 14,000 mothers enrolled in the study during 1991 and 1992, and their children's development has and is being followed). For this portion of the study, 11,875 pregnant women completed a nutritional survey 32 weeks into their pregnancy [13]. Maternal consumption of seafoods (ie. long chain omega-3 fatty acids) above the US recommended intake guidelines (340 g per week) was associated with a reduction in verbal IQ deficits in children. Low maternal ingestion of seafood was also associated with decreased social development, motor skills and communication scores in children [13]. These studies indicate that omega-3 fatty acids are essential for optimum neural development.

In adults, decreased levels of EFA (essential fatty acids) in combination with low cholesterol were observed in psychiatric patients with higher self-harm tendencies (ie. depression, impulsivity and suicidal intent) [14].

Recommended intake of fish and shellfish products in Canada

Health Canada Recommendations

Fish and shellfish that contain higher levels of omega-3 acids, and, are also low in mercury are recommended by Health Canada [15], they include anchovy, capelin, char, hake, herring, Atlantic mackerel, mullet, pollock (Boston bluefish), salmon, smelt, rainbow trout, lake whitefish, blue crab, shrimp, clam, mussel and oysters.

Some types of fish, however, are higher in mercury than others. These include fresh and frozen tuna, shark, swordfish, orange roughy and escolar. The retail mercury contaminant level in these fish has been set at 1.0 ppm, and reduced consumption of these products is advised. Restricting consumption of canned albacore tuna for certain people is also recommended by Health Canada. The retail mercury contaminant level for canned albacore tuna and all other retail fish is 0.5 ppm. According to Canada's food guide, a healthy diet includes two (2) servings of fish every week (one serving is equivalent to 75 g). The guidelines in the table modified below are those recommended by Health Canada [15].

Table 32 — Health Canada Guidelines for Fish Consumption

	Fresh/frozen Tuna, Shark, Swordfish, Marlin, Orange Roughy and Escolar†	**Canned Albacore (White) Tuna** (does not apply to canned light tuna)
General Population	150 g per week	
Women who are or may become pregnant or are breastfeeding	150 g per month	300 grams a week
Children 5-11 years old	125 g per month	150 grams a week
Children 1-4 years old	75 g per month	75 grams a week

† Maximum retail contaminant concentration is 1.0ppm. All other fish at retail (including canned tuna) is 0.5 ppm
http://www.hc-sc.gc.ca/fn-an/securit/chem-chim/contaminants-guidelines-directives-eng.php

British Columbia Recommendations

Provincial guidelines are similar, but not identical to the Health Canada guidelines. No serving limit on low risk seafoods is given for foods such as salmon, shrimp, sole or rainbow trout. Serving limits are given for 2 other categories of foods for 4 different populations and this is slightly different as compared to the Health Canada recommendations. Categories for children are broken down into 6 months old to 2 years (vs. 1 to 5 years) and 2 to 12 years (vs. 5 to 11 years in HC recommendations). Foods to eat in moderation include all canned tuna varieties, lake trout, various cod species (ie. sablefish), halibut and bass. The BC recommendations are more stringent and precautionary in their approach and suggest lower amounts of fish consumption for all age categories (a single 75g is equivalent to a serving).

Table 33 — BC Health File Guidelines for Fish Consumption

Choose Fish Low in Mercury BC Healthfile [16]

	Fish Low in Mercury	Person's Age	Serving Limit (no. of grams)
Eat Freely	**Salmon**, wild or farmed, fresh, frozen or canned **Shrimp** **Prawn** **Rainbow trout** **Atlantic mackerel** **Sole** or **Dover Sole**	Children 6 to 24 months	No limit
		Children 2 to 12 years	No limit
		Girls and Women of childbearing age, including pregnant and breastfeeding women	No limit
		Men (ages 12 and older) and Women after childbearing age	No limit
Eat in Moderation	**Fish Moderate in Mercury**	**Person's Age**	**Serving Limit**
	Canned Tuna, all varieties **Albacore Tuna**, fresh or frozen **Cod**, Atlantic **Bass** or **White Bass** **Halibut**, Pacific **Lake Trout** **Sablefish, Black Cod** or **Alaskan Black Cod** **Sea Bass, Barracuda**	Children 6 to 24 months	2 Servings a month (150g)
		Children 2 to 12 years	3 Servings a month (225g)
		Girls and Women of childbearing age, including pregnant and breastfeeding women	2 to 4 Servings a week (150 to 300g)
		Men (ages 12 and older) and Women after childbearing age	4 to 6 Servings a week (300 to 450g)
Limit	**Fish High in Mercury**	**Person's Age**	**Serving Limit**
	Bigeye Tuna, fresh or frozen (often called Ahi Tuna) **Escolar** **Shark** **Marlin** **Swordfish**	Children 6 to 24 months	Do not eat
		Children 2 to 12 years	1 Serving a month (75g)
		Girls and Women of childbearing age, including pregnant and breastfeeding women	2 Servings a month (150g)
		Men (ages 12 and older) and Women after childbearing age	4 Servings a month (300g)

One Serving is equal to 75g or 2.5oz or 125mL or 1/2 cup

How much omega-3 is recommended in the diet? Modest intakes of omega-3 from fish and fish oil of 250 to 500mg/day provide benefits of reducing cardiovascular disease and mortality [11]. Levels above 500mg/day did not show significant gains indicating there may be a threshold [11]. Salmon (a fish demonstrated to be low in mercury) contain approximately 900 to 1600mg of omega-3 in a single (75g) serving. Orange roughy (a fish demonstrated to be high in mercury) contains much less omega-3 at 230mg per serving. Clearly, responsible choice of seafoods by consumers favoring omega-3's and avoiding mercury can improve health. Table 34 illustrates amounts of omega-3 in various popular fish choices [10].

Table 34 — Grams of Omega-3 in 3 ounce servings of fish

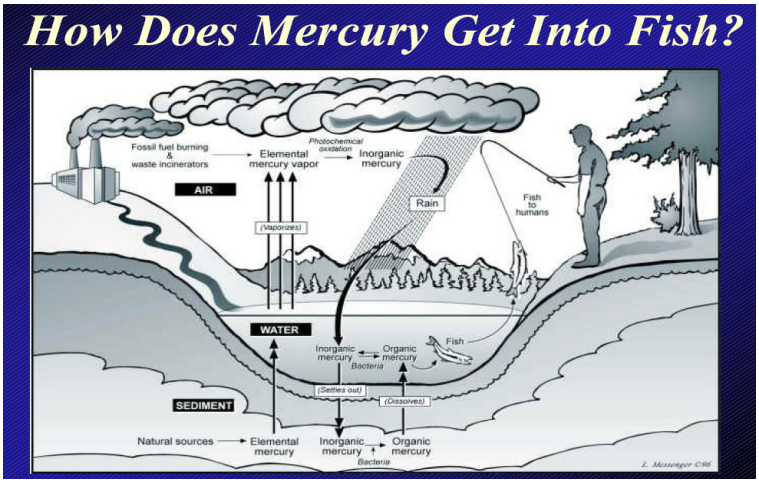
Grams of *n*−3 per 3oz serving of fish	
Common name	grams *n*−3
Tuna	0.21–1.1
Pollock	0.45
Salmon	1.1–1.9
Cod	0.15–0.24
Catfish	0.22–0.3

Grams of *n*−3 per 3oz serving of fish	
Common name	grams *n*−3
Flounder	0.48
Grouper	0.23
Halibut	0.60–1.12
Mahi mahi	0.13
Orange roughy	0.028

Grams of *n*−3 per 3oz serving of fish	
Common name	grams *n*−3
Red snapper	0.29
Shark	0.83
Swordfish	0.97
Tilefish	0.90
King mackerel	0.36

Risks associated with seafood consumption

Background:



Mercury is an inorganic element found in soil, water, and rock that can be released from volcanos, through erosion, fires and fossil fuel combustion. The levels of mercury in air and water are very low and not a significant source of concern. Inorganic mercury has low toxicity as it cannot be readily absorbed by the gastrointestinal tract and it does not readily cross the blood brain barrier. However, the conversion of mercury to methyl-mercury by microbial activity allows it to bind to proteins, for example, the muscle tissue in fish. Human exposure to methylmercury is primarily through ingesting foods containing methylmercury, like fish [17]. Larger fish predators bioaccumulate mercury through diet also, explaining why some types of fish (tuna, shark) have higher mercury levels than others (shrimp, salmon).

Methylmercury in the blood has a long half-life (~70 days in adults and ~90 days in children) and can cause serious neurodevelopment problems in infants that may be irreversible [17]. Methylmercury crosses the blood-brain and placental barriers and accumulates in the fetus at higher levels than in the mother. It interferes with infant brain development by inhibiting the division and migration of neuronal cells and disrupting the cytoarchitecture of the developing brain [17]. The central nervous system is the primary target of toxicity [18]. In adults acute toxicity may be characterized by prickling skin (paresthesia), blurred vision, confusion, delirium, memory loss, slurred speech or inability to form words (dysarthria) and inability to control muscular movements (ataxia) [18] [19]. Long term chronic exposure to methylmercury in diet is more difficult to assess because of the nutritional benefits of omega-3 fatty acids. In BC, two documented cases of elevated blood mercury levels from consumption of coastal fish were noted in two Asian families. In both cases, although the blood mercury levels were elevated; ranging from 180 to 370 nmol/L in one family eating black cod 3 times per week and >100 to 110 nmol/L in another family eating rock cod 3 times per day; both cases were asymptomatic [18]. Normal blood levels are usually less than 50 nmol/L. Chronic toxicity is associated with blood levels in excess of 1000 nmol/L [18]. The provisional tolerable daily intake for methylmercury (set by Health Canada) is currently 0.20 µg/kg bw/day for child-bearing women and young children [19].

Mercury Concentrations in Fish

Table 35 illustrates the average levels of mercury found in some imported and domestic fish.

Table 35 — Total Mercury Concentrations in Fish Reported by Health Canada, Bureau of Chemical Safety [19]

Fish Species	Mean MeHg µg/g or ppm
Amberjack	0.17
Barracuda (from the US)	0.77
Barracuda (not from the US)	0.12
Basa	0.02
Carp	0.10
Char, artic	0.09
Clam	0.03
Cod	0.06
Crab (Dungeness, Rock, Snow)	0.09
Cusk	0.35
Eel	0.19
Escolar	0.53
Flounder	0.06
Grouper	0.45
Haddock	0.05
Hake	0.08
Halibut	0.31
Herring	0.06
Lingcod	0.08
Lobster	0.09
Marlin	0.69
Mackerel	0.04
Mussel, Blue	0.03
Orange Roughy / Slimehead	0.47
Oyster	0.01
Perch	0.15
Periwinkle	0.03
Pollock	0.02
Prawn	0.04
Rockfish	0.07
Sablefish / Blackcod	0.20
Salmon - all species	0.02 to 0.05
Sauger	0.46
Scallop	0.04
Sea Bass	0.62
Sea cucumber or Sea urchin	0.00
Shark	1.36
Shark (Spiny Dogfish, Northern Shark)	0.64
Shark, Porbeagle	0.87
Shrimp / Prawn	0.05
Skate	0.14
Snapper	0.07
Sole	0.08
Sturgeon	0.10
Swordfish	1.82
Trout, Lake	0.23
Trout, Rainbow	0.04
Tuna, Albacore, canned & fresh	0.36 & 0.37
Tuna, Skipjack, canned	0.06
Tuna, Yellowfin, canned	0.05
Tuna, Yellowfin, fresh	0.29
Tuna canned (species not specified)	0.14
Tuna, Bigeye	0.65
Tuna, Southern Bluefin	0.28
Tuna, fresh or frozen (species not specified)	0.93
Wahoo	0.31
Walleye / Yellow Pickerel	0.37

Key:	
Greater than 0.2 ppm	
Greater than 0.5 ppm	

Data Source: [19]

Of note, black cod (sablefish) were documented to have levels of methylmercury above 0.2ppm, however, rockfish was below that level (note: only 2 rockfish samples were tested in the data reported by Health Canada). As black cod and rockfish were implicated in the BC cases of elevated blood methylmercury, and since elevated methylmercury above 0.5 ppm has been previously reported in BC rockfish [18] this fish may be a concern for people who consume it daily. Other fish with elevated levels of methylmercury include halibut, tuna, sea bass and others.

Other contaminant issues associated with fish

Other contaminants associated with fish include concerns with dioxins and PCBs, cadmium (in shellfish) and selenium and antibiotic residues. Levels of PCBs and dioxins in fish are similar to levels in other foods (beef, chicken, pork, dairy products and vegetables) [11]. In addition, fish and shellfish account for less than 10% of dietary exposure to dioxins and PCBs [11]. Cardiovascular health benefits for all ages evaluated outweighed cancer risk by 100 to 370-fold for farmed salmon and by 300 to more than 1000-fold for wild salmon [11].

The WHO guideline for maximum daily cadmium intake is 1 µg/kg per day [21]. A recent concern in BC was that this level would be exceeded by persons eating 6 oysters per day because the average cadmium concentration in BC oysters is 2-3 ppm (µg/g) [22]. In a telephone survey of 76 individuals who provided blood and urine samples, both the blood and urine concentrations of cadmium were found to be lower than the recommended maximums (of 5 µg/L and 5 µg/g cr respectively) [20]. Although oyster derived cadmium is absorbed into the body and increased consumption of oysters leads to increased blood cadmium concentration, these levels did not exceed the guidelines. In addition this study also found urine cadmium increases after many years of oyster farming, that higher serum iron level reduces blood cadmium concentration and that ketchup consumption with oysters may reduce cadmium absorption in the body [20].

However, cadmium reduces the kidney's ability to absorb essential nutrients, such as calcium into the body, and can result in decrease bone strength. Exposure has also been linked to other health affects, such as diabetes [23]. Certain individuals that have a higher risk of adverse health affects should limit their consumption of BC oysters and whole scallops. Scallops are only a problem when consumed whole. The more commonly consumed adductor muscle (the fleshy part of the scallop) is low in cadmium.

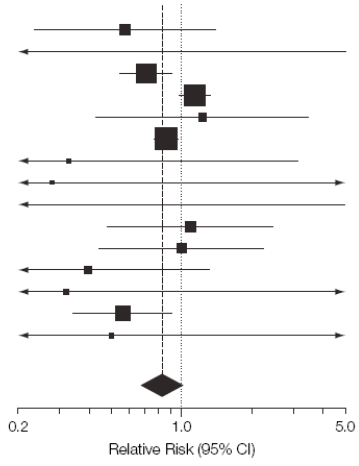
The current Health Canada policy on cadmium in BC oysters is to reduce risk by limiting consumption: for adults 12 (40 gram) oysters per month, and for children, 1½ oysters per month [24]. High risk individuals that should further limit their consumption of BC oysters and whole scallops include smokers, regular consumers (such as harvesters and First Nations), consumers of traditional game meats and organs, diabetics and people with renal disease, women with low iron and children. For further information about cadmium, consult the Fish Safety Note in the appendix.

Conclusions

In the review by Mozaffarian and Rimm [11], consumption of fish or fish oil reduced the risk of mortality. The overall relative risk was 0.83 (showing a protective effect from consumption of fish or fish oil).

Risk of Total Mortality Due to Intake of Fish or Fish Oil in Randomized Clinical Trials [11]

Source	% Weight	Relative Risk (95% CI)
Brouwer et al,[62] 2006	3.9	0.57 (0.24-1.38)
Brox et al,[87] 2001	0.3	0.17 (0.01-4.05)
Burr et al,[3] 1989	18.7	0.71 (0.55-0.92)
Burr et al,[51] 2003	24.4	1.15 (0.99-1.34)
Eritsland et al,[88] 1996	2.9	1.23 (0.43-3.51)
Gruppo Italiano,[9] 1999	26.0	0.86 (0.76-0.97)
Johansen et al,[89] 1999	0.7	0.33 (0.03-3.18)
Kaul et al,[90] 1992	0.3	0.28 (0.01-6.78)
Leaf et al,[91] 1994	0.4	0.20 (0.01-4.18)
Leaf et al,[61] 2005	4.6	1.09 (0.49-2.46)
Nilsen et al,[92] 2001	4.6	1.00 (0.45-2.24)
Raitt et al,[60] 2005	2.3	0.40 (0.12-1.32)
Sacks et al,[56] 1995	0.3	0.32 (0.01-7.57)
Singh et al,[93] 1997	9.9	0.56 (0.34-0.91)
von Schacky et al,[57] 1999	0.6	0.50 (0.05-5.39)
Overall	100.0	0.83 (0.68-1.00)



References

[1] Postnikoff, L. 2009: Vancouver.

[2] Touchet, K. 2009: Vancouver.

[3] Seltenrich, R. 2009: Vancouver.

[4] Egeler, J. 2009: Vancouver.

[5] Kerr, A. 2009: Vancouver.

[6] BC Centre for Disease Control, *Guideline for the Construction and Operation of Mobile Fish Vending Units*, Food Protection Services, Editor. 2008: Vancouver, BC.

[7] BC Centre for Disease Control, *Guideline for the Sale of Foods at Temporary Markets*, Food Protection Services, Editor. 2009: Vancouver, BC.

[8] Government of British Columbia. *BC Seafood Industry Year in Review 2008*. 2010; Available from: http://www.env.gov.bc.ca/omfd/reports/YIR-2008.pdf

[9] BC Centre for Disease Control, *Live Retail Fish Holding Guidelines*, Food Protection Services, Editor. 2009: Vancouver, BC.

[10] Wikipedia. *Omega-3 Fatty Acids*. [cited 2010 April 6]; Available from: <http://en.wikipedia.org/wiki/Omega-3_fatty_acid>

[11] Mozaffarian, D. and E.B. Rimm, *Fish Intake, Contaminants, and Human Health: Evaluating the Risks and the Benefits.* JAMA, 2006. **296**(15): p. 1885-1899.

[12] Oken, E., et al., *Maternal fish consumption, hair mercury, and infant cognition in a U.S. Cohort.* Environ Health Perspect, 2005. **113**(10): p. 1376-80.

[13] Hibbeln, J.R., et al., *Maternal seafood consumption in pregnancy and neurodevelopmental outcomes in childhood (ALSPAC study): an observational cohort study.* Lancet, 2007. **369**(9561): p. 578-85.

[14] Garland, M.R., et al., *Lipids and essential fatty acids in patients presenting with self-harm.* Br J Psychiatry, 2007. **190**: p. 112-7.

[15] Health Canada. *Mercury in Fish. Consumption Advice: Making Informed Choices about Fish.* 2008 [cited 2010 April 6]; Available from: http://www.hc-sc.gc.ca/fn-an/securit/chem-chim/environ/mercur/cons-adv-etud-eng.php

[16] HealthLink BC. *Healthy Eating: Choose Fish Low in Mercury*. Nutrition Series 2008 March [cited 2010 April 7]; :[HealthLink BC File #68m]. Available from: http://www.healthlinkbc.ca/healthfiles/hfile68m.stm

[17] Kostatsky, T., *Fish and mercury: advising populations, advising health*. 2009: Richmond.

[18] Gair, R., *Mercury in BC Coastal Fish*. 2005, BC Drug & Poison Information Centre: Vancouver.

[19] Health Canada, *Human Health Risk Assessment of Mercury in Fish and Health Benefits of Fish Consumption*, Bureau of Chemical Safety, et al., Editors. 2007, Publications Health Canada: Ottawa, Ontario.

[20] Ray Copes, Kay Teschke, and Nina Clark. *Cadmium Absorption from the Consumption of BC Oysters*. Available from: http://www.cdc.ubc.ca/Publications/Presentations/CopesBCCDCFeb1-08.pdf

[21] European Food Safety Authority, *Cadium in food. Full report*, in *Scientific Opinion of the Panel on Contaminants in the Food Chain*. 2009: Parma, Italy.

[22] Bendell, L.I., *Survey of levels of cadmium in oysters, mussels, clams and scallops from the Pacific Northwest coast of Canada.* Food Additives & Contaminants Part B-Surveillance, 2009. **2**(2): p. 131-139.

[23] Satarug, S., et al., *Cadmium, environmental exposure, and health outcomes.* Environmental health perspectives, 2010. **118**(2): p. 182-190.

[24] Health Canada, *Cadmium* 1986: Ottawa, ON.