

Section 1 — Law, Jurisdictional Roles and Responsibilities of Federal and Provincial Organizations

1.1 *Laws and Legislation governing Fish*

Federal Government

These four agencies within the federal government deal with fish, shellfish and/or public health matters related to fish and shellfish in some capacity.

1. Canadian Food Inspection Agency (CFIA)
2. Environment Canada (EC)
3. Fisheries and Oceans Canada (DFO)
4. Health Canada (HC)

The federal legislation governing fish and shellfish are the following:

Canadian Food Inspection Agency Act (R.S. 1997, c.6)

<http://laws.justice.gc.ca/eng/c-16.5/index.html>

Consumer Packaging and Labelling Act

<http://laws.justice.gc.ca/eng/cs/C-38/index.html>

Fish Inspection Act (R.S., 1985, c. F-12)

<http://laws.justice.gc.ca/eng/F-12/index.html>

Fish Inspection Regulations (C.R.C., c. 802)

<http://laws.justice.gc.ca/eng/C.R.C.-c.802/index.html>

Fisheries Act (R.S., 1985, c. F-14)

<http://laws.justice.gc.ca/eng/F-14/index.html>

Fishery (General) Regulations (SOR/93-53)

<http://laws.justice.gc.ca/eng/SOR-93-53/index.html>

Food and Drugs Act (R.S., 1985, c. F-27)

<http://laws.justice.gc.ca/eng/F-27/index.html>

Food and Drug Regulations (C.R.C., c. 870)

<http://laws.justice.gc.ca/eng/C.R.C.-c.870/index.html>

Species at Risk Act (2002, c.29)

<http://laws.justice.gc.ca/eng/S-15.3/index.html>

Provincial Government

These five agencies within the provincial government deal with fish, shellfish and/or public health matters related to fish and shellfish in some capacity.

1. BC Ministry of Agriculture (MAGRI)
2. BC Ministry of Environment (BCMOE)
3. Regional Health Authorities (RHA's)
4. Ministry of Health (MOH)
5. Provincial Health Services Authority, BC Centre for Disease Control (BCCDC)

The provincial legislation governing fish and shellfish are the following:

Fish Inspection Act [RSBC 1996] CHAPTER 148

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_96148_01

Fish Inspection Act FISH INSPECTION REGULATIONS (B.C. Reg. 12/78)

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/10_12_78

Fish Inspection Act FORM OF OATH REGULATION (B.C. Reg. 233/93)

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/11_233_93

Fisheries Act [RSBC 1996] CHAPTER 149

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_96149_01

Fisheries Act FISHERIES ACT REGULATIONS (B.C. Reg. 140/76)

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/11_140_76

Fisheries Act AQUACULTURE REGULATION B.C. Reg. 78/2002

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/10_78_2002

British Columbia Sport Fishing Regulations, 1996 (SOR/96-137)

<http://laws.justice.gc.ca/en/showtdm/cr/SOR-96-137//?showtoc=&instrumentnumber=SOR-96-137>

Food Safety Act [SBC 2002] CHAPTER 28

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_02028_01

BC Public Health Act

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_08028_01

Health Act FOOD PREMISES REGULATION (B.C. Reg. 210/99)

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/11_210_99

Offence Act [RSBC 1996] CHAPTER 338

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_96338_01

Offence Act – Violation Ticket Administration and Fines Regulation 89/97

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/89_97_01

Wildlife Act [RSBC 1996] CHAPTER 488

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_96488_01

1.2 Roles and Responsibilities of the Agencies

A. FEDERAL

An overview of all agencies responsible for food safety in British Columbia can be found in Table 1, listing the ministry responsible; enforcement agency; legislation acted under; regulations, codes and policy; the establishment type and activity type. Brief description of each agencies role are listed for activities pertaining to fish inspection, regulation, registration, inspection, enforcement and other aspects of fish food safety.

Canadian Food Inspection Agency

The Canadian Food Inspection Agency (CFIA) develops and verifies compliance with appropriate product and process standards that contribute to the acceptable quality, safety and identity of fish and seafood products that are processed in federal establishments or imported into Canada.^[1]

The CFIA activities include:

- ▶ registration of federal fish processing establishments;
- ▶ inspection of imported fish and fish products;
- ▶ developing and maintaining international arrangements with countries with recognized inspection systems;
- ▶ inspection and enforcement of regulations, including enforcing label regulations;
- ▶ residue testing.

Registration for fish processing establishments is granted if the establishment meets requirements under the federal Fish Inspection Regulation. The CFIA asks all establishments to use a Quality Management Plan (QMP) as a requirement of registration. This plan outlines controls to ensure fish products are processed under sanitary conditions, and that the product is safe, the quality is acceptable and that it complies with all federal regulations. The plan includes procedures, record-keeping and documentation, and includes the principles of HACCP. For shellfish processing, plants must also comply with the Canadian Shellfish Sanitation Program (CSSP) manual. CFIA is, in general, responsible for all fish products destined for inter-provincial and international sale and all canned and shellfish products (including intra-provincial sales).

Environment Canada

Environment Canada assesses waters and shellfish for sanitary and bacteriological contamination for the CSSP to determine areas that may be opened for shellfish harvesting. The CSSP is jointly administered by EC, CFIA and DFO. EC also manages waste and sewage discharge into ocean waters.

Fisheries and Oceans, Canada

The mandate of the Conservation and Protection (C&P) arm of Fisheries and Oceans, Canada (abbreviated as DFO): is “to ensure compliance with the legislation, policies and programs that relate to the conservation and protection of Canada’s fishery resources, their habitats and ocean environment and to ensure their best use by present and future generations”.

Fisheries and Oceans, Canada also manages the commercial, sport, aquaculture and Aboriginal fisheries^[2]. Part of the management process involved in the commercial fishing industry is the production of “Integrated Fishery Management Plans”. The general goal of these management plans is to ensure the conservation and protection of stocks, to ensure optimal use of those stocks, to develop fishing plans, to preserve, enhance and restore aquatic habitat, to optimize quality of fish harvested and to ensure that health and safety concerns are met.

Provincial Fish Inspection

Fishery Officers working for the Conservation and Protection branch are responsible for ensuring compliance with numerous pieces of legislation ^[2]. The most important is the *Federal Fisheries Act* and *Regulations*. Some of the other forms of legislation Fishery Officers deal with include the Criminal Code of Canada, the Firearms Act, the Wildlife Act and both Federal and Provincial *Fish Inspection Acts* and their accompanying regulations. Fishery Officers (so designated under the *Fisheries Act*) by designation are also Peace Officers under the Criminal Code of Canada, Special Conservation Officers under the *Wildlife Act*, Habitat Inspectors under the *Fisheries Act* and Inspectors under the *Provincial Fish Inspection Act* ^[2].

Department of Fisheries and Oceans and its Fishery Officers, rely heavily on information supplied to them by other agencies and the general public, for illegal fisheries related activities and occurrences. The public program is called the Observe, Record and Report Program (ORR). A 24-hour, toll-free reporting line is available to relay any and all information about suspected violations.

That number is: 1.800.465.4336 (Fisheries 24 hour violations reporting line)

Health Canada

Health Canada creates policy and standards for the safety and nutritional quality of food sold in Canada. These are enforced by CFIA and DFO inspectors. They also create consumer safety education materials for the general public.

B. PROVINCIAL

In British Columbia, three levels of government (federal, provincial and local health authorities) are involved in food inspection. The Ministry of Health has the primary responsibility for food safety. The Ministry of Agriculture are partners in the agri-food system, and are responsible for farm safety production programs. The Ministry of Agriculture is also responsible for the *Fish Inspection Act* and *Fisheries Act* in BC. A number of *Acts* and *Regulations* provide authority for the inspection activity. In some cases provincial inspection activity is contracted to the Canadian Food Inspection Agency. In other cases, by agreement with the federal government, provincial or health authority staff carry out all activities. An overview of all food safety legislation in BC is shown in Table 1.

BC Ministry of Agriculture

The BC Ministry of Agriculture (abbreviated as MAGRI and previously known as MAL) manages the seafood industry through various legislation. MAGRI is responsible for the issuance and regulatory compliance of commercial fisheries licences ^[4]. The basis of the mandate lies within the context of the *Fisheries Act* (R.S.B.C. 1996 Chapter 149) and *Fish Inspection Act* (R.S.B.C. 1996 Chapter 148), and accompanying regulations. Through these pieces of legislation and several Memorandum of Understanding (MOUs) with other agencies, the Ministry of Agriculture licences:

- ▶ all provincial fish processing plants, fish buying stations, fish brokers and fish vendors; and
- ▶ harvesters of wild oysters and/or marine plants.

For provincially licenced fish processing plants, the Health Authorities perform annual inspections and make recommendations to MAGRI for new and renewal licencing.

Roles and responsibilities between agencies are shown in Appendix 1.2A and Appendix 1.2B.



Reference Manual

Table 1 — Federal/Provincial/Territorial Legislation Related to Food Safety (table adapted from [3])

MINISTRY RESPONSIBLE	ENFORCEMENT AGENCY	LEGISLATION	REGULATIONS, CODES, POLICY	ESTABLISHMENT TYPE	ACTIVITY TYPE
Ministry of Health	• Health Authorities	• Public Health Act	• Food Premises Regulations • National Food Retail and Foodservices Code	• Food retail • Food service • Food processing plants intra- provincial trade • Slaughter houses not subject to provincial meat inspection legislation	• Inspection • Licensing • Enforcement • Education • Food handler education
Ministry of Health	• BC Centre for Disease Control and • Health Authorities	• Food Safety Act	• Meat Inspection Regulations	Abattoirs and processing at same location	• Inspection • Licensing • Enforcement • Education
Ministry of Health	• BC Centre for Disease Control	• Milk Industry Act	• Milk Industry Standards Regulations • National Dairy Code	• Dairy processing plants and finished dairy product standards	• Inspection • Licensing • Enforcement • Education
Ministry of Agriculture	• Health Authorities and • Ministry of Agriculture	• Fish Inspection Act • Fisheries Act	• Fish Inspection Regulations • Fisheries Act Regulations	• Provincially licensed fish processing plants	• Inspection • Licensing • Enforcement • Education
Ministry of Agriculture	• Ministry of Agriculture	• Milk Industry Act	• Milk Industry Standards Regulations • National Dairy Code	• Dairy farms and dairy herd health	• Inspection • Licensing • Enforcement • Education
Ministry of Agriculture	• Ministry of Agriculture	• Fish Inspection Act	• Fish Inspection Regulations • Fisheries Act Regulations	• Fish buying stations, brokers and vendors • Harvesters	• Inspection • Licensing • Enforcement • Education

Health Authorities

There are 5 regional health authorities in the province of BC: Fraser (FHA), Interior (IHA), Northern (NHA), Vancouver Coastal (VCHA) and Vancouver Island (VIHA), and one provincial health authority (PHSA).

The regional Health Authorities provide a full range of health care services ranging from hospital treatment to community-based residential, home health, mental health and public health services [5]. Under the Environmental Health program the main areas include drinking and recreational (pools, hot tubs, spray parks) water, food safety, facility licencing, air quality, land use, personal services, communicable disease control, tobacco strategy and other programs. Services include education, inspection and enforcement. Food service establishments are inspected routinely and on complaint by Environmental Health Officers. Provincial fish processing plants, retail outlets selling processed fish products, fish and shellfish products are also inspected routinely (annually) and on complaint. Health Authorities also develop educational materials for the public and their clients.

Food Protection Services (FPS) is a department within Environmental Health Services at the BC Centre for Disease Control, one of the agencies within the PHSA. FPS assists in a consultative capacity by acting as a scientific resource and providing guidance materials for HA's and fish processor applicants. Food Protection Services also develops and provides educational material for consumers, Environmental Health Officers and other stakeholders regarding fish and shellfish safety.

Appendix 1.2A — Roles and Responsibilities Between Agencies in BC

The following administrative arrangements have been put in place:

1. Where violations of another participant's mandate are observed in the normal course of duties; all participants agree to communicate and record the observance to the participant with jurisdiction.
2. The DFO is responsible for monitoring catch reporting and verifying accurate and timely completion and submission of fish slips from licensed fish buyers, brokers, processors and fish vendors as required under the *Fish Inspection Act* (B.C.).
3. The CFIA will audit all federally registered fish and bivalve mollusc processing establishments to determine compliance with the Fish Inspection Regulations of Canada.
4. The CFIA will audit commercial and sport caught fish canneries and products to determine compliance with the Fish Inspection Regulations of Canada.
5. The CFIA will monitor commercially sold aquaculture products, processed at a federally registered establishment, to verify that the residue limits established by Health Canada have not been exceeded and that the products do not contain illegal therapeutants.
6. In consultation with the Health Authorities (HA) and/or the MAGRI; the CFIA may assess premises and domestic manufacturer controls, or undertake sampling in response to food safety investigations, or assessing risks of federal concern.
7. The CFIA will inspect new-to-fleet fishing vessels to verify compliance with the Fish Inspection Regulations of Canada.
8. Persons designated as Fish Inspectors in the federal or provincial *Fish Inspection Acts* or Regulations can from time to time inspect fishing vessels and take appropriate actions.
9. The HA will inspect food services and retail stores to ensure food safety compliance with the Food Premises Regulation.
10. The HA will inspect mobile food premises (business licensed) selling fish to ensure food safety compliance with the Food Premises Regulation.
11. The HA will be responsible for the inspection of those fish processing facilities, including processing of ready to eat fish, that require only Provincial Fish Processing licences to ensure compliance with the British Columbia Fish Inspection Regulations. This does not include marine plant processing operations or those operations exclusively processing sport caught fish.
12. The Ministry of Agriculture (MAGRI) will inspect fish vendor sales to ensure compliance with the British Columbia Fish Inspection Regulations.
13. The MAGRI will inspect fish buying stations to ensure compliance with the British Columbia Fish Inspection Regulations.
14. The MAGRI will inspect sport caught fish processing facilities, other than canneries, where the processing is exclusively sport caught fish, and marine plant processing establishments to ensure compliance with the British Columbia Fish Inspection Regulations.
15. The MAGRI will administer licensing of all fish processing plants and fish buying stations only after MAGRI has established to their satisfaction that the operation is in full compliance with applicable fish inspection requirements under the British Columbia Fish Inspection Regulations.
16. The MAGRI will administer licensing of all commercial fish vendor operations as required under the *Fisheries Act* (B.C.).
17. The MAGRI will, from time to time, review with CFIA and the HAs their respective inspection programs to verify they meet the requirements to establish compliance with provincial regulatory requirements.

Appendix 1.2B — Responsibility Matrix

Activity to complete		Lead Agency Responsibility			
		CFIA	DFO	MAGRI	HA
1	Where violations of another participant’s mandate are observed in the normal course of duties; all participants agree to communicate and record the observance to the participant with jurisdiction.	X	X	X	X
2	Monitor catch reporting slips from buyers, brokers, processors and vendors and verify compliance with catch reporting requirements.		X		
3	Audit federally registered establishments that process fish and bivalve molluscs.	X			
4	Audit commercial and sport caught fish canneries.	X			
5	Monitor commercially sold aquaculture products, processed at a federally registered establishment, to verify that the residue have not been exceeded and that the products do not contain illegal therapeutants.	X			
6	May assess premises and domestic manufacturer controls or undertake sampling in consultation with the HA and/or the MAGRI.	X			
7	Inspect new-to-fleet fishing vessels.	X			
8	Periodically inspect fishing vessels and take actions.	X	X	X	
9	Inspect for food safety compliance in food services and retail stores.				X
10	Inspect mobile food premises selling fish to ensure food safety compliance.				X
11	Inspect fish processing facilities, including processing of ready to eat fish, requiring only Provincial Fish Processing licences.				X
12	Inspect fisher vendor sales, under the British Columbia Fish Inspection Regulations.			X	
13	Inspect fish buying stations.			X	
14	Inspect sport caught fish processing facilities and marine plant processing establishments.			X	
15	License all fish processing plants and fish buying stations.			X	
16	License all commercial fish vendor operations.			X	
17	Review, with CFIA and HA, inspection programs to verify they meet the provincial regulatory requirements.			X	

DEFINITIONS

“**Bivalve Mollusc**” means shellfish of the phylum Mollusca, class Bivalvia, comprised of common forms such as clams, oysters, scallops and mussels, either shucked or in the shell, in whole or in part.

“**Confidential Information**” means information marked as confidential by the Participants and treated consistently in a confidential manner by the Participants.

“**Establishment**” means any place where fish are handled, processed, graded or stored.

“**Federal Certificate of Registration**” means a certificate issued to an establishment where fish are processed for export in accordance with subsection 15(6) of the Fish Inspection Regulations (Canada).

“**Fish**” means any fish, including shellfish and crustaceans, and aquatic animals, and any parts, products or byproducts of them.

“**Fish Buying Station**” means a building, structure vehicle, vessel, scow, barge or float used in the business of buying, collection, assembling, transporting, conveying, packing or carrying fish direct from a fisher.

“**Fish Processing Plant**” means a building, structure, vehicle, vessel, scow, barge or float either ashore or afloat occupied and used in the business of processing fish.

“**Fish Vendor**” means any commercial fisherman selling their own catch.

“**Food**” means any raw, cooked or processed substance, including, but not limited to, ice, beverage or ingredients used or intended for use, in whole or in part, for human consumption.

“**Food-borne Illness**” means a human illness caused by a microbiological, chemical, or inert physical hazard, in circumstances where there is evidence that food was the common source of exposure to the contaminant causing the illness.

“**Information**” means personal information, confidential information that is not personal information, or nonconfidential information.

“**Inspector**” means a person who is an inspector as defined under the *Fish Inspection Act* (Canada and/or B.C.) or the *Food and Drugs Act*.

“**Outbreak**” means an increase above expected levels of incidents in which two or more persons experience similar illness after a common source exposure.

“**Personal Information**” means information about an identifiable individual that is recorded in any form including the meaning ascribed to the term in the *Privacy Act* and the *Freedom of Information and Protection of Privacy Act*.

“**Processing**” includes cleaning, filleting, icing, freezing, canning, packing, smoking, salting, cooking, pickling, drying; or preparing fish for market in any other manner.

“**Provincial Processing Licence**” means a licence issued pursuant to section 13 or 22 of the *Fisheries Act* (B.C.).

1.3 MAGRI & DFO Investigations

BC Ministry of Agriculture (MAGRI) Compliance and Enforcement Branch for Aquaculture and Commercial Fisheries	Fisheries and Oceans Canada (DFO) Conservation and Protection
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Inspections and Investigations

DFO Fishery Officers and MAGRI Fisheries Inspectors both engage in inspection (compliance) and investigation (enforcement) activities. The types of inspections conducted usually fall into one of the following categories ^[6]:

- ▶ Pre-Licence Inspection
- ▶ New Licensee or Operation Inspections
- ▶ Routine Inspections
- ▶ Problem Operations
- ▶ Covert Inspections
- ▶ Extraordinary Inspections
- ▶ Investigations
- ▶ Post Contravention Follow-up

In most types of operations the number of inspections per year are discretionary. Aquaculture and harvest operations tend to require a mandatory once per annum inspection frequency ^[6]. Increased inspection frequency will occur in “problem” operations at the discretion of the Section Head or Director. Problem operations are identified through repeated non-compliance, complaints by other regulatory authorities, and violation tickets

DFO Fishery Officers and MAGRI Fisheries Inspectors have the responsibility to investigate several different types of contraventions or problems in the various programs under their jurisdiction. The types of contraventions encountered vary slightly depending on the department (DFO or MAGRI) and the Acts and Regulations they operate under, the type of program, and the type of premise being inspected. MAGRI Officers operate under the [Fisheries Act \(BC\)](#), the [Fish Inspection Act \(BC\)](#) and accompanying regulations. DFO Officers also have authority under these Acts, and are designated as Fish Inspectors (similarly, EHO have authority under these Acts by taking the Fish Inspection Act Oath of Office). DFO Officers also operate under the Federal [Fisheries Act](#), the [Fish Inspection Act](#) and it's accompanying regulation, the [Fish Inspection Regulations](#) and [Fishery \(General\) Regulations](#). These give the Officers the powers to take action on premises contravening the legislation.

Provincial Fish Inspection

A generalized list of contraventions and powers used are listed below ^[2].

Contraventions

- ▶ Operating Without a Valid Licence
- ▶ Licensee Operating Outside Approved Area
- ▶ Unauthorized Species
- ▶ Unauthorized Improvements
- ▶ Processing Tainted, Decomposed or Unwholesome Fish
- ▶ Failure to Comply With the Laws of Other Government Authorities
- ▶ Failure to Submit Required Reports

Powers

- ▶ Entering an Aquaculture Facility During Normal Business Hours
- ▶ Compelling Production of Records for Inspection
- ▶ Taking Samples of Fish
- ▶ Detention and Release of Fish
- ▶ Directing the Disposal of Tainted, Decomposed or Unwholesome Fish
- ▶ Fisheries Act Seizure
- ▶ Fish Inspection Act Seizure
- ▶ Offence Act Search and Seizure

Some of the possible outcomes of inspections and investigations would be to document compliance or non-compliance. In the non-compliant cases, the operator would be subject to several possible outcomes, depending on the situation. The first step would be a compliance meeting with the owner, followed by a warning and possible referral to other agencies (depending on the issue). DFO Officers issue “demand notices” when they require an owner to submit additional information ^[7]. This authority is granted in Section 49 and 61 of the [Fisheries Act](#). Other progressive outcomes include a charge for a provincial offense by a violation ticket, a charge for provincial offense by report to Crown Counsel and licence related sanctions ^{[6] [7]}.

DFO Fishery Officers and MAGRI Fisheries Inspectors wear uniforms and carry fire-arms. They wear their uniforms when they are conducting inspections at any number of premises, including:

- ▶ Grocery stores
- ▶ Restaurants
- ▶ Processing plants (cold storage, smoking etc.)
- ▶ Native reserves
- ▶ Boats, docks and fishing lodges
- ▶ Beaches and harvest areas (ie. fishing grounds)
- ▶ Landing stations
- ▶ Vehicles



Sometimes, DFO Fishery Officers and MAGRI Fisheries Inspectors perform their work out of uniform and undercover. This can occur for specific operations, probes and surveillance activities. In the course of their investigations they may require court approved warrant to trace vehicle movements using GPS devices or set-up video or phone surveillance [8]. Warrants are required in situations when the person being investigated has a reasonable expectation of privacy, for instance in their home. The Charter of Rights and Freedoms specifies in these cases warrants will only be granted with judicial permission. These approvals are only granted when sufficient evidence is gathered on suspicious activity [8].

Evidence, tips, cautions and predominant purpose

Evidence can come from several sources. Public and industry complaints are sometimes not reliable if they are based on rumor or a competitor looking to cause trouble. Anonymous tips are also not considered credible. However, complaints and tips from EHO's are an important source of information to DFO and MAGRI Officers. The source of the information must be trustworthy (with no reason to lie), and EHOs are considered to be credible sources. In order for complaints (or tips) to generate a warrant the information not only has to come from a reliable source, but it has to be complete. A good tip will contain the following key pieces of information for the complaint: what occurred, when it occurred, where it occurred and how it occurred [8]. Finally a good tip will need to be corroborated. Most tips will result in Officers conducting an investigation themselves to try to corroborate the tip before applying for a warrant. In summary, any complaint that generates a warrant must have the three "C's" [8].

- ▶ Complete
- ▶ Credible
- ▶ Corroborated

Any information received is considered a tip and catalogued on a "*Fisheries Intelligence Report*" [7]. Tips are graded as to the validity of the information (ie. the information received was confirmed, probably true, possibly true, doubtfully true, an improbable report or the truth could not be judged). The report itself will be assigned a security level and stored appropriately [7].

DFO Fishery Officers and MAGRI Fisheries Inspectors have two major roles as part of their professional duties. They conduct inspections and investigations. How they conduct themselves is crucial to the success of any operation, especially if offences are noted that may lead to prosecutions (and court cases). DFO and MAGRI Officers must consider their actions during a routine compliance inspection – when they encounter a non-compliance (depending on what it is) they may either continue the routine compliance inspection or immediately proceed to an investigation [8]. At this point, they must legally "caution" the operator, ie. read the charter warning and inform the operator of their right to silence. How information is gathered is known as the predominant purpose test [8].

Predominant Purpose Test	
Inspection	To ensure and monitor compliance
Investigation	To gather evidence to determine penal liability

DFO has an additional specific requirement to protect endangered species and species at risk in the [Species at Risk Act \(2002, c.29\)](#).

CSI for GSI

Real-life Crime Scene Investigation techniques are used to determine GSI, or genetic stock identification of salmon and abalone. DFO also has the ability to effectively trace back the species of fish, and additionally to trace where the fish was captured (called population of origin). This is based on several different types of DNA tests on the fish. The only testing lab in Canada is located in Nanaimo at the Pacific Biological Station. The evidence gathered from these investigations, and resulting laboratory identification has successfully led to several case prosecutions ^[9].

Table 1. Species identification of salmonid tissue samples collected by fishery officers.

Case (year)	Tissues	Result	Defendant	Legal outcome	Fine (\$)
1 (1995)	24 scales; 4 blood/scales/ slime from containers	Coho	Harvester	Conviction	1 500
2 (1998)	35 muscle	Chum Chinook Coho	Harvester	Conviction	1 800
3 (1998)	4 muscle	Coho	Harvester	Conviction	?
4 (1999)	20 muscle	Atlantic Chinook Coho	Harvester	No charges	—
5 (2000)	1 muscle	Coho	Harvester	Guilty Plea	7 500
6 (2000)	1 muscle	Sockeye	Restaurant	Conviction	1 000

In cases 1–5, the DNA analysis confirmed that the fish examined included coho salmon that had been illegally harvested or sold. In case 6, analysis confirmed that a restaurant was serving illegally purchased sockeye salmon rather than farmed Atlantic salmon.

To differentiate salmonid species (ie. sockeye, coho, atlantic, chum) the preferred method is to assess variations in the MHC (major histocompatibility complex) genes by PCR–RFLP (polymerase chain reaction–restriction fragment length polymorphisms) ^[9]. Essentially, variations in this gene allow different weights of DNA to be amplified that can be visualized on an agarose gel. DNA is negatively charged and will travel in one direction in an electric field according to its weight. If required further tests can be conducted to examine intraspecies variability, ie. to distinguish between genetic stocks or populations of a single salmonid species such as Fraser River Sockeye.

The laboratory has developed an extensive database on sockeye (and other salmon species) that allows them to determine the population origin a fish. This is based on MHC and microsatellite gene target sequences that are assessed using a mathematical model (maximum likelihood analysis) ^[9]. The heterogeneity between fish of the same species from different geographic regions allows fish biologists to determine specifically the stream where a fish was hatched. This allows them to assess fish stocks and, in combination with harvest information collected by DFO Fishery Officers, together they can determine if the fish was caught in a legal open fishery. An example of how this might be used is that of fish caught in a legal open lower Fraser River fishery, are sold along with illegally obtained fish either caught in the upper Fraser River or harvested earlier before the legal opening (i.e. fishery openings are carefully timed so vulnerable salmon population runs are not harvested, allowing them to migrate to their natal river or creek bed to spawn) ^[9].

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Table 4. GSI analysis of sockeye and chinook samples collected by fishery officers. N_{SAMP} gives the number of tissue samples provided by the fishery officer and N is the number of distinct genotypes observed among the samples.

Case (year)	$N_{SAMP}(N)$	Species	Analysis	Base-line	Results	Defendant	Outcome	Fine (\$)
1 (1998)	144 fin clips	Sockeye	ML mixture	1	100% Fraser; 97.5% IF&T	Harvester	No charges; fish seized in U.S.A	—
2 (1998)	20 fin clip	Sockeye	ML mixture	1	96.5% Fraser; 96.5% IF&T	Harvester	Guilty Plea	2000
3 (1999)	5 muscle	Sockeye	ML mixture	1	100% Fraser	Harvester	No charges laid	—
4 (1999)	90 muscle	Sockeye	ML mixture	1	96% Fraser; 95% IF&T	Harvester	No conviction, under appeal	—
5 (1999)	50 cans	Sockeye	ML mixture	2	100% Fraser; 100% IF&T	Harvester	Conviction	15 000

The loci used in the baseline data sets are shown in Table 3. Analysis of unknowns was carried out by maximum likelihood (ML) analysis or Bayesian (Bayes) classification of individual genotypes. In all cases, the fishery officer suspected that the source of fish was the Fraser River and, more specifically, tributaries of the Interior Fraser and Thompson River (IF&T) drainages.



These tests can be performed on a wide variety of fish samples. The most common submissions are fish scales or fin clips, and fresh fish tissue either frozen or preserved in ethanol. However, slurries of fish blood from a cooler, and even cooked (ie. canned) salmon have been used when necessary.

Source: [2]

Another DFO laboratory (Ocean Sciences in Sidney, BC) has one other additional novel test – based on oxygen – that is used to determine if a salmon was caught in fresh water or ocean water. Liquid water (H_2O) is comprised of three different isotopes of oxygen, ^{16}O , ^{17}O and ^{18}O . The amounts of these isotopes will vary in the source water; fresh water has more ^{16}O , while ocean water has more ^{18}O than fresh water. Fish breathe oxygen through their gills, and as the oxygen transfuses through the blood stream will store the oxygen, and the oxygen isotopes in their tissues. Using these tests, combined with the evidence collected by a Fisheries Officer, they can determine if a salmon was caught in the ocean on its migratory path, or whether it was inhabiting fresh water when caught [10].

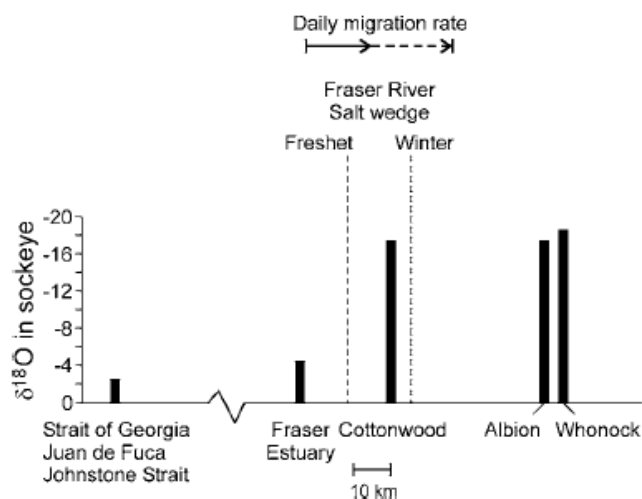


FIGURE 4.—A selection of data showing $\delta^{18}O$ in fish tissue along a section going from distal points in the British Columbia coastal waters to the Fraser Estuary and up the Fraser River as far as Whonock (~60 km upstream from the mouth of the Fraser River). The penetration of the salt wedge into the Fraser River is shown as maximum and minimum values (low winter flow and freshet, respectively; Thomson 1981). For comparison, migration rates of sockeye salmon between Mission and the Thompson Junction are shown at top (data from English et al. 2005).

Abalone and Poaching

Northern or pinto abalone (*Haliotis kamtschatkana*) is a protected species under the *Species at Risk Act* [11]. Abalone wild fisheries have been closed in BC (and Canada) since 1990 [11], however, some species but not pinto abalone is also harvested in aquaculture [12]. In 2008, aquaculture abalone, scallops and mussels had a wholesale value of 5 million dollars [12]. This highly sought after univalve shellfish has a market value of \$30 to \$40 dollars a kilogram [11]. However, wild abalone sells from \$77 to over \$120 dollars a kilogram and is used as currency in the criminal trade [14]. The demand for abalone often exceeds the supply, and is a preferential shellfish in lower mainland Asian restaurants [11] [14]. In an investigation by DFO, 11,000 abalone were seized from Haida harvesters in Port Edwards [14]. This resulted in a court decision of a \$20,000 fine, 12 months imprisonments to be served in the community, seizure of the pick-up (at left) and boat, and prohibition of scuba-diving for 5 years [14].



Photo: Truck full of abalone poached near Prince Rupert.
Source: [2]

One of the challenges with abalone is that visual identification of the species is only possible when the shell is still on the animal. In illegal trading of abalone, legitimate aquaculture species or legitimate species from other markets (ie. pink or green Mexican abalone, there are 7 species in total) are often mixed with illegally harvested northern pinto abalone [14].

Photo: shucked frozen mixed green, pink and pinto abalone in a freezer box
Source: [2]



How does DFO assess whether the abalone seen is legitimate? The DFO Pacific Biological Station Laboratory also has a DNA test to assess abalone species. This is based on a test of the lysine and vitelline egg receptor lysin (VERL) genes [14]. The lysine target is at intron 2, amplification of this region results in 2 gene products, dividing the southern abalone species (product is 753 to 1.4 kb in length) from the northern abalone species (product is 470 to 524 bp in length) [14]. Further differentiation of the species can be done using the VERL gene targets [14].

In summary, BC MAGRI and DFO Fisheries Officers work together to assess compliance, and investigate fraud, poaching and illegal activity in the fisheries. They are fortunate to be able to use state-of-the-art laboratory testing services to assist them with their investigations.

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