

PACIFIC REGION

MARINE FINFISH

INTEGRATED

MANAGEMENT OF

AQUACULTURE PLAN

December 2013 – Version 1.1



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Canada

This Management Plan is intended for general purposes only.

Where there is a discrepancy between the Management Plan and the regulations, the regulations are the final authority.

FOREWORD

The purpose of the marine finfish Integrated Management of Aquaculture Plan (MF-IMAP) is to identify the main objectives and requirements for management of marine finfish aquaculture in British Columbia, as well as the management measures that will be used to meet these objectives. The document serves to communicate basic information about marine finfish aquaculture and its management to federal and provincial agencies, local government, industry, First Nations, stakeholders, and the public.

The MF-IMAP will be reviewed every two years in order to ensure it is current and to incorporate changes in the management approach as required (e.g. new scientific or other information, adoption of management tools, policies or approaches, and changing dynamics in the sector).

The MF-IMAP is not a legally binding instrument which can form the basis of a legal challenge. The MF-IMAP can be modified at any time and does not fetter the discretionary powers of the Minister of Fisheries and Oceans as set out in the *Fisheries Act*, *Species at Risk Act*, and the *Oceans Act*; as well as the *Fishery (General) Regulations* or the *Pacific Aquaculture Regulations*. The Minister can, for reasons of conservation or for any other valid reasons, at any time modify any provision of the MF-IMAP in accordance with the powers granted pursuant to the *Fisheries Act*, the *Oceans Act*, or the *Species at Risk Act* and supporting regulations.

Where Fisheries and Oceans Canada is responsible for implementing obligations under land claim agreements, the MF-IMAP will be implemented in a manner consistent with these obligations. In the event that an MF-IMAP is inconsistent with obligations under land claims agreements, the provisions of the land claims agreements will prevail to the extent of the inconsistency.

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1. BACKGROUND AND OVERVIEW OF THE SECTOR

1.1 Background

In December 2010 the Government of Canada assumed primary responsibility for the regulation and management of aquaculture in British Columbia (BC). As the lead federal agency, the Department of Fisheries and Oceans Canada (DFO, the Department) is responsible for regulating, monitoring and licensing all marine finfish aquaculture operations in the province. In order to carry out these responsibilities the *Pacific Aquaculture Regulations* (<http://laws-lois.justice.gc.ca/eng/regulations/SOR-2010-270/>) were developed under the *Fisheries Act* to govern the management and regulation of the aquaculture industry in BC. The regulations aim to ensure that aquaculture in BC is operated in a sustainable manner, so that the marine environment is protected for future generations. The Department also established the British Columbia Aquaculture Regulatory Program (BCARP) to support implementation of the regulations and day-to-day management of the sector.

While the DFO is the lead federal authority, the legislative and regulatory framework requires that other federal departments and provincial agencies also have roles in managing and regulating various aspects of aquaculture in BC. For example, in addition to DFO's federal responsibilities, Transport Canada is responsible for reviewing applications with respect to the protection of navigable waters in Canada, and the Canadian Food Inspection Agency has jurisdiction related to aspects of fish health and processing.

The Province of British Columbia remains responsible for authorizing the occupation of provincial aquatic Crown land associated with aquaculture operations. Aquatic Crown land refers to land below the visible high tide water mark of a body of water, extending offshore to the recognized limit of provincial jurisdiction, including the foreshore. In some cases zoning, administered by local governments, also applies in marine and foreshore areas.

Under the *Pacific Aquaculture Regulations*, aquaculture is defined as “the cultivation of fish.” The marine finfish Integrated Management of Aquaculture Plan (MF-IMAP) is concerned with the cultivation of any marine fish cultivated in a marine environment. Fish are cultivated when there is human intervention in the rearing process to enhance production, such as regular stocking, feeding, and protection from predators. Cultivation also implies individual or corporate ownership, control, and responsibility for the stock being cultivated.

The MF-IMAP outlines the management framework for marine finfish aquaculture in BC. In some cases, where more than one cultivation method is used, the process of cultivating fish throughout a life cycle may fall under more than one IMAP (e.g. marine finfish and freshwater/land-based). This includes the situation where juvenile marine finfish are reared on land and then transferred to marine net pens at some stage of their life cycle.

Consistent with its overall management of fisheries, DFO has established advisory processes to support the development of IMAPs and to provide a mechanism for groups to provide feedback to DFO more broadly regarding the management of aquaculture in BC. The marine finfish Aquaculture Management Advisory Committee (MF-AMAC) is comprised of First Nations, marine finfish aquaculture licence holders, industry associations, environmental interests and local government. DFO and the Government of BC are ex-officio participants, but are not formally members of the committee. The Terms of Reference for the MF-AMAC, along with

contact information and a schedule of meetings, is available on the DFO Pacific Region consultations webpage (<http://www.pac.dfo-mpo.gc.ca/consultation/index-eng.html>).

The MF-AMAC reviews the MF-IMAP on a regular basis and provides advice and recommendations to DFO with respect to the management of marine finfish aquaculture in BC. In addition, DFO undertakes bilateral consultation with individual First Nations, and works with the First Nations Fisheries Council and other organizations on broader processes to engage First Nations in discussions related to the management of aquaculture in BC.

1.2 Sector Overview

DFO currently licenses approximately 125 marine finfish aquaculture facilities with a total combined allowable peak biomass of approximately 280,000 tonnes (calculated by adding up the total allowable biomass of all existing licences, including those which are not currently in production and those used for broodstock or transfer purposes). Generally about half of these facilities have fish in production at any given time. A list of all current marine finfish aquaculture licence-holders is available on the DFO website: <http://www.pac.dfo-mpo.gc.ca/aquaculture/licence-permis/docs/finfish-pisciculture-eng.html>.

1.2.1 Cultivated Species

The majority of marine finfish aquaculture licences are issued for salmon, with Atlantic salmon (*Salmo salar*) being the most commonly farmed fish in BC. A number of other species are also cultivated on a smaller scale and/or are being tested for feasibility by aquaculturists and research institutions.

Atlantic salmon are a preferred species for marine finfish cultivation around the world. Domesticated Atlantic salmon feed well on pellets, are valued by industry for their feed conversion ratio and growth rates, and their ability to adapt to the confines of a net pen.

Atlantic salmon are not native to BC waters. Between 1905 and 1935 there were a number of attempts to introduce Atlantic salmon to BC rivers for recreational fishing purposes, but these were unsuccessful. At the present time there are no known feral Atlantic salmon populations in BC.

In addition to Atlantic salmon, there are other marine finfish being actively cultivated on a commercial basis in BC. These species are all indigenous to the Pacific coast of Canada, and include: chinook salmon (*Oncorhynchus tshawytscha*); coho salmon (*Oncorhynchus kisutch*); rainbow/steelhead trout (*Oncorhynchus mykiss*); and black cod (*Anoplopoma fimbria*) also known as sablefish.

1.2.2 Cultivation Methods

In general, marine finfish aquaculture operations have both below and above water infrastructure. Facilities consist of containment structures (net pens) comprised of between six and sixteen square cages surrounded by metal walkways, or circular net cages. Containment structure arrays are held in place by a series of anchors and lines which radiate out from the infrastructure. Netting must adhere to established strength requirements, with mesh sizes that vary depending on the size of fish being reared at a facility. Predator netting is often attached around the nets to discourage marine mammals and other predatory fish (e.g. dogfish) from trying to gain access to the fish on the site. In some cases solid or bag-like material provides a

physical barrier between cultivated fish and the marine environment and these facilities may include a variety of types water exchange processes.

The majority of facilities have associated infrastructure including an office, a fish health lab, a generator shed, fish food and mortality storage areas, floats, docks, and accommodation for staff. Most facilities are located in remote areas around northern and western Vancouver Island and, to a lesser degree, the central coast of BC and Sechelt Inlet.

In addition to typical marine-based finfish facilities, there are examples of experimental, multi-trophic aquaculture facilities in BC which culture seaweeds, shellfish and finfish at the same facility.

1.2.3 Aquaculture Operations and Characteristics

Pacific salmon have been cultivated at freshwater hatcheries in BC since the early 1900s. The original goal of these enhancement facilities was to augment the number of wild salmon and support commercial and (later) recreational fishing opportunities.

In the mid-1980s the aquaculture industry began farming Atlantic salmon in BC, importing eggs from domesticated stock in Europe. Today, most aquaculture companies harvest eggs from their own fish which have been reared in BC over several generations and are bred for traits that allow them to thrive in the local marine environment. In some cases DFO provides limited access to wild or enhanced fish stocks for broodstock development. Access of this kind is provided through the *DFO Policy for Access to Wild Aquatic Resources as it Applies to Aquaculture* (<http://www.dfo-mpo.gc.ca/aquaculture/ref/AWAR-ARAS-eng.htm>).

Licencees may apply to import eggs from outside of Canada, however these eggs must meet stringent requirements as set out by the Canadian Food Inspection Agency, the leading authority on disease risk management of fish imports (since 2010). With respect to Atlantic salmon, there have been no eggs imported for commercial aquaculture purposes since 2009. There have been imports of sablefish eggs and fry within recent years, as this new industry works to establish an effective broodstock program.

Information relating to the process of applying for an introductions and transfers licence is available here: <http://www.dfo-mpo.gc.ca/aquaculture/regions/pac/introduction-eng.htm>.

Information from the DFO Public Reporting website relating to Atlantic salmon egg imports is available here: <http://www.pac.dfo-mpo.gc.ca/aquaculture/reporting-rapports/egg-oeuf-eng.html>.

For the cultivation of salmon, the life cycle begins in a freshwater hatchery. As fry emerge from their eggs, they are transferred into troughs or tanks. There is a continuous flow of water provided in the tanks, and the fish are fed a diet appropriate to their size. As the fish grow, they are moved into different tanks to maintain the desired stock densities. Cultivation of species such as sablefish may also use hatcheries and tanks to breed and rear young fish. More information regarding freshwater/land-based aquaculture, including the generic DFO Conditions of Licence can be found at the following link: <http://www.pac.dfo-mpo.gc.ca/aquaculture/licence-permis/fresh-douce-eng.html>

Juvenile fish are generally kept in a controlled setting in order to create optimal growing conditions and to protect them from disease and predation. Vaccination occurs in the juvenile stage, most commonly by injection, prior to transfer from the controlled setting of the hatchery to

the open marine environment or to land or marine-based containment facilities. The transfer to ocean-based net pens or larger land-based facilities takes place via trucks or live-haul boats.

The number of salmon grown at a marine finfish aquaculture facility during a typical production cycle ranges from 200,000 to 1,000,000 (in 2013).

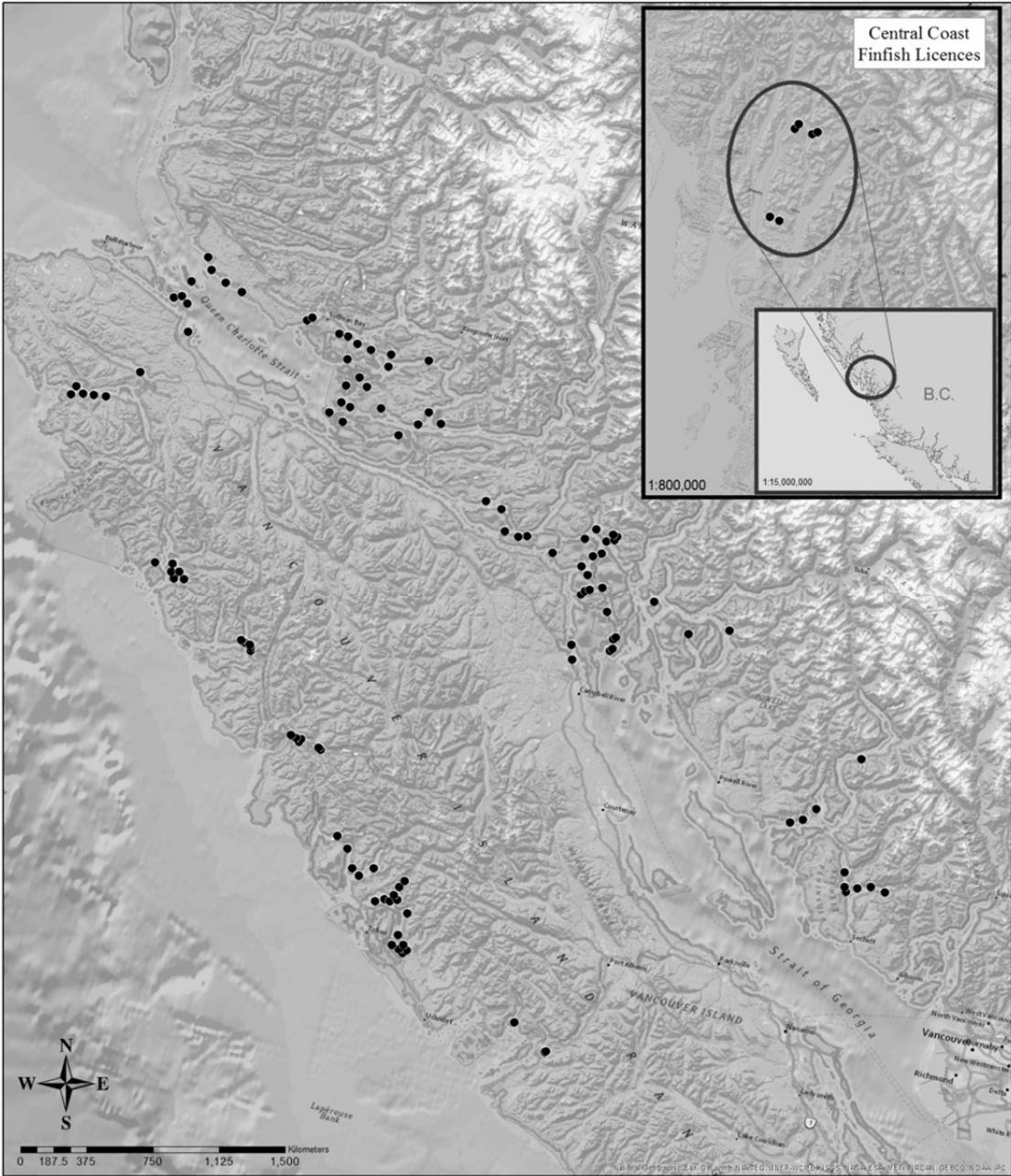
Good husbandry practices discourage frequent handling of fish as this increases stress on the animals and can have a negative impact on their health. Fish are often graded (separated according to size and maturity) so that fish in various pens/tanks will be ready for harvest around the same time. At harvest, fish may be transported from aquaculture facilities to processing facilities either via a live-haul vessel, or killed while they are loaded onto a transport vessel or vehicle. They are then transported to processing plants.

A production cycle can take up to five years when broodstock selection, production schedules and other factors are taken into consideration. A typical Atlantic salmon grow-out cycle from stocking of smolts to harvesting of adults is approximately 20 – 24 months. For Pacific salmon, the grow-out cycle is typically shorter; approximately 18 months for chinook and 15 months for coho.

1.2.4 Locations of Licensed Aquaculture Facilities

Most marine finfish aquaculture in BC takes place within a few specific areas: the West Coast of Vancouver Island, northern Vancouver Island (North Island Straits and the Broughton Archipelago), eastern Vancouver Island (the Discovery Islands/ upper Johnstone Straits area), Sechart Inlet, and BC's Central Coast. The map below provides an overview of the locations of marine finfish aquaculture licences in 2013.

Marine Finfish Aquaculture in British Columbia



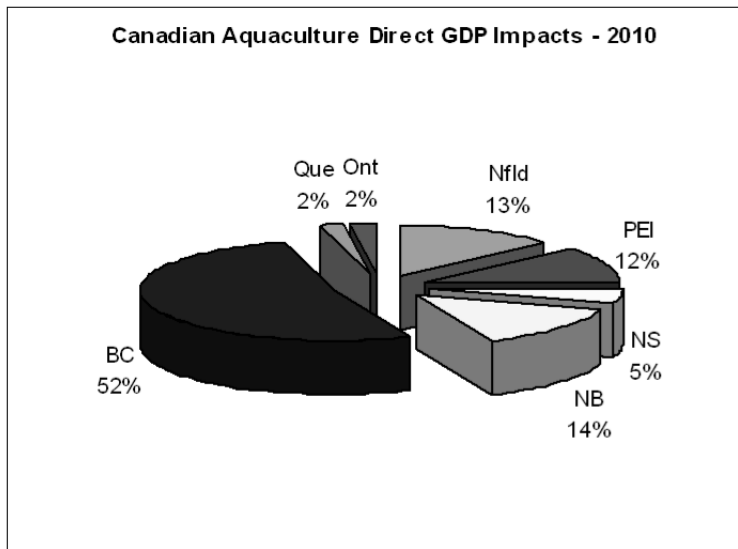
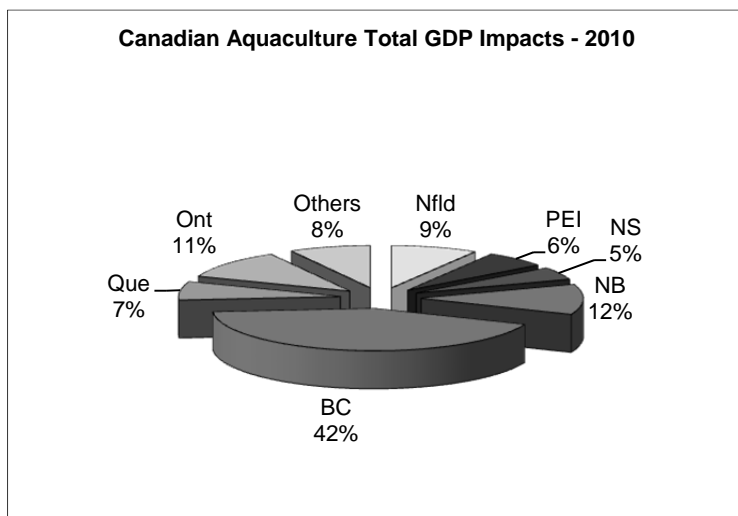
<p>Legend</p> <ul style="list-style-type: none"> ● 2013 DFO Marine Finfish Licences 	 <p>AQUACULTURE MANAGEMENT Ensuring Sustainable Fisheries</p>	<p>Produced by DFO Aquaculture Resource Management Date: October 24, 2013 Data: Province of BC, Tantalus September 2013 Basemap: National Geographic</p>  <p>Fisheries and Oceans Canada / Pêches et Océans Canada</p>
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1.3 Economic Profile of the Aquaculture Industry

Canada is the 27th largest producer of aquaculture products in the world and the fourth largest producer of salmon after Norway, Chile and the United Kingdom.¹ Aquaculture production occurs across Canada, with the bulk of production occurring in the Atlantic provinces and BC. In 2010, Canadian aquaculture production had a final product value of approximately \$1.1 billion.² Finfish accounted for about 89% of the value. The BC aquaculture industry is the largest in Canada, with BC producers accounting for 56% of Canadian finfish value (\$990 million).

Gross Domestic Product (GDP) measures the value added to the economy by an activity and includes wages, owner profits, returns to invested capital, changes in inventories and depreciation. The aquaculture sector can affect the economy through direct, indirect and induced impacts.³ In 2010, the direct contribution to Canadian GDP from aquaculture was about \$354 million, of which \$185 million was in BC (0.09% of the BC total GDP). The indirect effect was an additional \$464 million in Canada and \$173 million in BC. The induced effects added \$246 million to Canadian GDP, \$95 million of which was in BC. The overall impact on the GDP of Canada was \$1.1 billion (0.07% of total Canadian GDP), of which \$452 million was in BC (0.21% of total BC GDP). BC accounts for a larger share of direct impacts than total impacts as there are substantial indirect and induced impacts in Ontario and Quebec, both of which have limited aquaculture production.

There are a number of ways to measure aquaculture production,



¹ Food and Agriculture Organization of the United Nations (FAO). Global Aquaculture Production. Online dataset available at: <http://www.fao.org/fishery/statistics/global-aquaculture-production/en>. Accessed: August 2013.

² Fisheries and Oceans Canada (DFO). 2013. Socio-Economic Impact of Aquaculture in Canada, 2013 Edition. Accessed: August 2013.

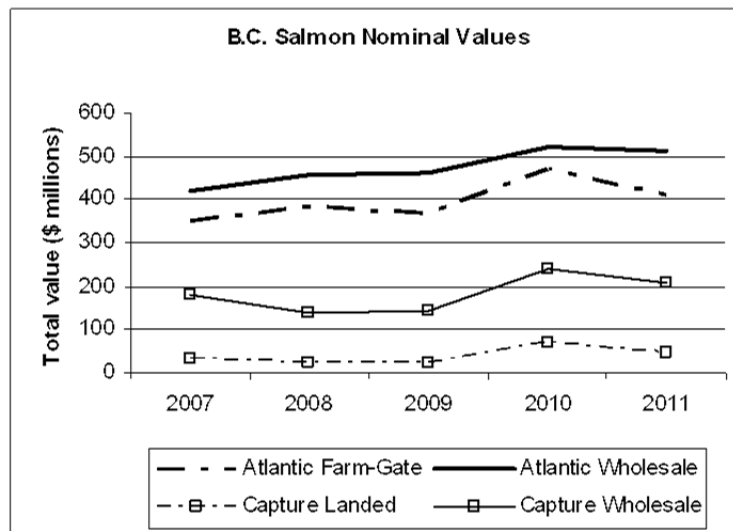
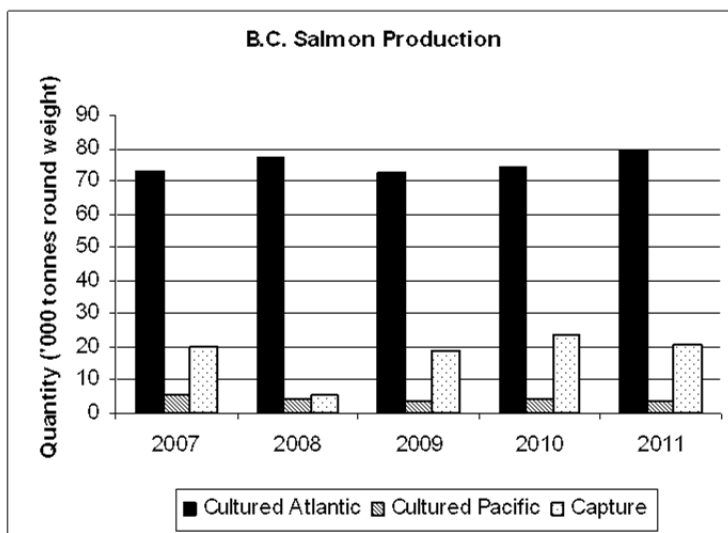
³ Direct impacts are the result of expenditures by aquaculture companies (e.g. feed, maintenance on net pens), indirect impacts are due to expenditures by suppliers to the aquaculture sector, and induced impacts are the result of employees of aquaculture companies and their suppliers spending their earnings.

including: quantity produced (tonnes), farm-gate value⁴, final product value⁵ and wholesale value⁶. Since finfish aquaculture producers may be highly integrated, the final product value, which is the value of final products sold into the wholesale market by Canada's aquaculture companies, may more completely capture the value of the product that leaves the aquaculture operation. Wholesale value net of the farm-gate value is a measure of increase in output value from processing.

Salmon is the primary finfish cultivated in Canada. In 2011, BC produced 74% of Canada's cultivated salmon, with the remainder produced by New Brunswick (21%) and Nova Scotia (6%).⁷ Salmon accounts for about 98% of B.C.'s finfish aquaculture and averaged production of almost 80,000 tonnes over the last five years, which is more than four times the capture salmon harvest average.

Approximately 95% of BC's marine finfish aquaculture production is Atlantic salmon and 5% is Pacific salmon, which includes chinook, coho, and steelhead.⁸ Sablefish (or black cod) is the only other cultivated marine finfish species in BC and occurs at a small scale; other cultivated finfish are in freshwater (e.g. sturgeon, tilapia and rainbow trout).

The economic contribution of cultivated salmon to the GDP of BC has exceeded the contribution of all the salmon capture fisheries since 1996, as the percentage of the market occupied by



⁴ Farm-gate value, called landed value in the capture fishery, is measured at the first point of transfer from the producer to some other party (e.g.: processor, broker, or consumer). In general this would exclude value added due to processing, although in the case of aquaculture that may not always be clear or true.

⁵ Final product value includes any value added gained through basic processing (e.g.: dressing and filleting) by the aquaculture producer, and is measured when the product moves to a processor for further processing or to the wholesale market. This measure was developed by Gardner Pinfold (2010).

⁶ Wholesale value measures the value of product as it leaves the processor and moves into the wholesale or retail sector; processors may use both domestic and imported raw product.

⁷ Statistics Canada. Various years. Aquaculture Statistics. Cat. No. 23-222-X. Available: <http://www5.statcan.gc.ca/bsole/olc-cel/olc-cel?catno=23-222-XIE&lang=eng#formatdisp>. Accessed: August 2013.

⁸ Ministry of Agriculture. Various years. British Columbia Seafood Year in Review. Available: <http://www.env.gov.bc.ca/omfd/reports/>. Accessed: August 2013.

capture fisheries declined and the salmon aquaculture market share grew.⁹ Cultivated salmon now account for over 50% of the landed/farm-gate value of seafood in BC and approximately 40% of the wholesale value. In recent years, the total wholesale values for Atlantic salmon have been approximately double that for all capture salmon combined, while farm-gate value has been many times that of landed value.

1.4 Employment

Most salmon farming jobs in BC are full-time, year-round, and located between Comox and Port Hardy, along the corridor created by Vancouver Island and the mainland. Significant processing of aquaculture product occurs in plants in the same area but can also occur at plants outside this area. As the supply of input to the plants is not dependent on fishing seasons, the work is generally continuous. The aquaculture labour force is young in comparison to the capture fisheries. In BC, people under 40 years of age hold about 60% of aquaculture jobs, and only 30% of positions in the capture fishery.¹⁰ As with GDP, job impacts from aquaculture may be direct, indirect and induced. Employment is measured in full-time equivalents (FTEs) or person-years (PY) which are similar.

Statistics Canada estimated that the aquaculture sector in BC employed an average of 1,700 people in both 2010 and 2011. Income declined by 5% from \$58.5 million in 2010 to \$55.7 million in 2011.

Table 1: Employment impacts in 2010 by total aquaculture and salmon aquaculture in BC, estimated using multipliers (BC Stats 2013) with production and processing combined (Prod = primary production, Proc = processing facilities). Jobs are measured in number of employees, and income is measured in thousands of dollars (nominal).

	Total Aquaculture				Salmon Aquaculture			
	Jobs		Income		Jobs		Income	
	<i>Prod</i>	<i>Proc</i>	<i>Prod</i>	<i>Proc</i>	<i>Prod</i>	<i>Proc</i>	<i>Prod</i>	<i>Proc</i>
Direct	1,918	443	85,472	15,860	1,794	337	79,952	12,040
Indirect	1,870	170	101,498	10,309	1,749	129	94,943	7,826
Induced	395	52	21,368	2,379	370	40	19,988	1,806
Total	4,183	665	208,338	28,548	3,913	505	194,883	21,672

The employment impacts as a result of the processing of aquaculture production are relatively low. This appears to be due to two factors. First, aquaculture producers often harvest and do significant cleaning and gutting of the fish, so some of the production impacts are a result of this in-house processing activity. Also, much of BC cultivated salmon is sold in a product form with relatively low value-added (e.g. chilled/frozen gutted/headed whole fish) reducing employment requirements per unit of production, compared to other products (e.g. fillets).

A recent report commissioned for the Mt. Waddington Regional District on the northern end of Vancouver Island estimated that the finfish aquaculture industry directly contributes \$19.2

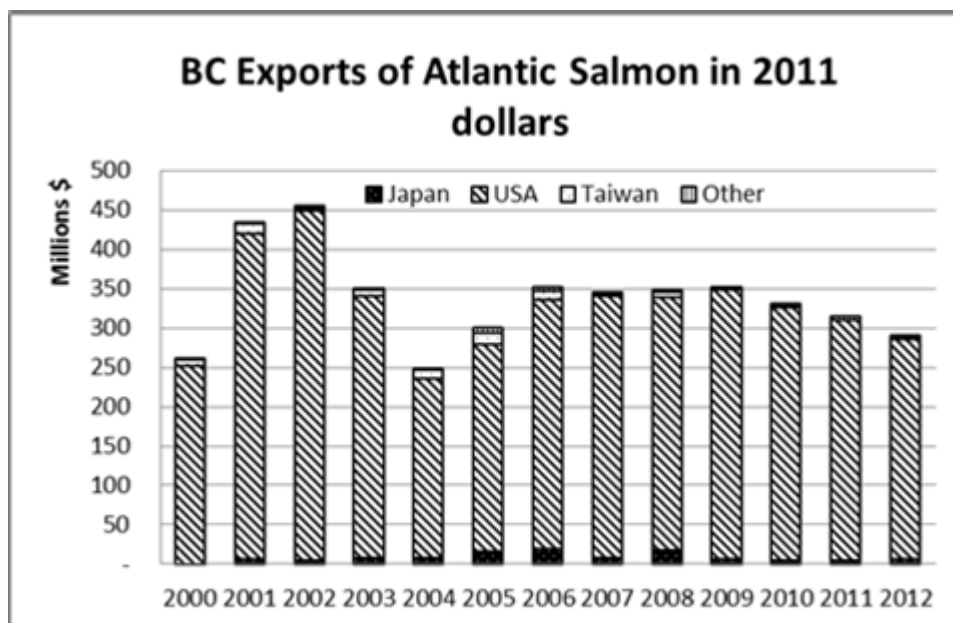
⁹ BC Stats. 2013. British Columbia's Fisheries and Aquaculture Sector, 2012 Edition. Available at: <http://www.bcstats.gov.bc.ca/Publications/AnalyticalReports.aspx>. Accessed: August 2013.

¹⁰ Statistics Canada, 2008 Tax filer data, DFO special run.

million in wages and 400 person-years of employment annually, which comprises a significant portion of the economy of that area.¹¹

1.5 Markets and Prices

The main product for BC farmed salmon is chilled/frozen gutted/headed whole fish with an export value of \$5.58/kg in 2012. Processed products such as fresh fillets may receive nearly \$9/kg but they only comprise a small share of exports (less than 3% of volume exported from 2007-2011). The main markets for BC aquaculture are the United States (approximately 65% of BC wholesale value) followed by the domestic market (approximately 30% of BC wholesale value) and then, a distant third, Japan.



Source: Statistics Canada EXIM database

Global demand for all salmon has grown steadily, in part due the development of new markets by Norway and Chile, the major farmed salmon producers.¹² Chile remains Canada’s main competitor in the US market for farmed salmon. Canada primarily supplies the US with whole salmon (lower value-added), while Chile is the main supplier of value-added products such as fillets (where the cost of transportation represents a lower share of the overall market price).

2. LEGISLATIVE, GOVERNANCE & POLICY FRAMEWORK

DFO’s aquaculture management approach in BC is guided by the broader mandate and strategic priorities of the Department. DFO is the lead federal agency responsible for developing and implementing legislation, regulations, policies and programs in support of Canada’s scientific,

¹¹ “The Marine Economy & the Regional District of Mt. Waddington” prepared for the Living Oceans Society and Regional District of Mt. Waddington, March 2011.

¹² Knapp, Gunner. 2013. Trends in Alaska and World Salmon Markets. Available: <http://www.iser.uaa.alaska.edu/people/knapp/personal/> Accessed: August 2013.

ecological, social and economic fisheries interests in oceans and fresh waters. For the purposes of aquaculture in BC, the most relevant pieces of legislation are:

The *Fisheries Act* which provides, among other things, broad powers to the Minister for the proper management and control of commercial, aboriginal, and recreational fisheries, and the activity of aquaculture. As part of various long-standing arrangements, the provinces have assumed administrative responsibility for the management of most inland fisheries.

The *Oceans Act*, among other things, provides authority to the Minister to lead the development and implementation of plans for the integrated management of activities affecting estuaries, coastal and marine waters, and the coordination of oceans issues. The *Act* also establishes the Minister's responsibility for Coast Guard services, as well as responsibility for marine science services such as the Canadian Hydrographic Services' nautical charts and publications.

While the Minister of Environment has primary responsibility for the administration of the *Species at Risk Act*, the Minister of Fisheries and Oceans is the minister responsible for aquatic species.

DFO supports strong economic growth in the aquaculture and capture fisheries sectors and contributes to a prosperous economy through global commerce by supporting exports and advancing safe maritime trade. The Department supports the innovation needed for a knowledge-based economy through research in expanding sectors such as aquaculture and biotechnology. The Department contributes to sustainable aquatic ecosystems for Canadians through habitat protection, oceans management, and ecosystems research. A safe and secure Canada relies on the maritime security, safe navigation, presence on our waters, and effective search and rescue services that the Canadian Coast Guard provides.

DFO's Mission and Vision, along with additional information on the organization, is provided on the Department's web pages (<http://www.dfo-mpo.gc.ca/us-nous/vision-eng.htm>).

DFO's Mission: Through sound science, forward-looking policy, and operational and service excellence, Fisheries and Oceans Canada employees work collaboratively toward the following strategic outcomes:

- economically prosperous maritime sectors and fisheries;
- sustainable aquatic ecosystems; and
- safe and secure waters.

DFO's Vision: To advance sustainable aquatic ecosystems and support safe and secure Canadian waters while fostering economic prosperity across maritime sectors and fisheries.

The Department's goals are to increase the economic benefits associated with Canada's maritime sectors, fisheries, and aquaculture and to enhance the competitiveness of these sectors in existing areas, as well as in emerging areas such as Canada's North.

Other federal agencies also have important legislation governing aquaculture – for example the Canadian Food Inspection Agency is responsible for the *Health of Animals Act*; Health Canada the *Food and Drug Act* and the *Pest Control Products Act*, and Transport Canada the *Canada Shipping Act*.

In British Columbia, provincial legislation relates to business and labour aspects, processing of fish, as well as the tenuring of Crown land. Local government jurisdiction relates to issues of zoning.

2.1 Regulation

The *Fishery (General) Regulations* (FGR) and the *Pacific Aquaculture Regulations* (PAR) are the principle *Fisheries Act* regulations governing the activity of marine finfish aquaculture activities in BC. These regulations frame the management and regulation of aquaculture activities on the Pacific coast, establishing a licensing regime consistent with the other fisheries managed by the Department but tailored to address the uniqueness of the aquaculture sector.

Conditions of Licence developed under the *Pacific Aquaculture Regulations* incorporate aspects of aquaculture that were covered in the former provincial regulations and licensing regime, and also include those aspects previously managed federally, for example: introductions and transfers of fish, marine mammal interactions, and habitat protection.

2.2 Policy

Legislation and regulations provide a legal framework for the management of aquaculture, while Departmental policies and management approaches provide more specific context and detail in terms of how that authority is translated into management. Aquaculture-related policies exist on both a national and regional level.

The Aquaculture Policy Framework provides a high level overview of DFO's approach to aquaculture management. Numerous other policies relate to DFO's approach on specific diverse aspects of aquaculture management, such as introductions and transfers of fish, broodstock collection, compliance and enforcement approaches, and interaction with wild species designated under the *Species at Risk Act*.

2.2.1 Fisheries and Oceans Canada Aquaculture Policy Framework

As the lead federal agency for aquaculture development, and consistent with its Departmental mandate, DFO discharges its responsibilities in a manner that adheres to the following Aquaculture Policy Framework principles:

- DFO will support aquaculture development in a manner consistent with its commitments to ecosystem-based and integrated management, as set out in Departmental legislation, regulations and policies.
- DFO will address issues of public concern in a fair and transparent manner, based on science and risk-management approaches endorsed by the Government of Canada.
- DFO will communicate with Canadians and seek their input on issues pertaining to aquaculture development.
- DFO will respect constitutionally protected Aboriginal and treaty rights and will work with interested and affected Aboriginal communities to facilitate their participation in aquaculture development.
- Recognizing that aquaculture is a legitimate user of land, water and aquatic resources, DFO will work with provincial and territorial governments to provide aquaculturists with predictable, equitable and timely access to the aquatic resource base.

- DFO will strive to ensure that its own legislative and regulatory frameworks enable the aquaculture sector to develop on an even footing with other sectors.
- In consultation with other federal departments, the provinces and territories, the academic sector and industry, DFO will support responsible development of the aquaculture sector.
- DFO will make every effort to understand the needs of the aquaculture industry and to respond in a manner that is solutions-oriented and supportive of aquaculture development.
- DFO will work with other federal departments, and with provincial and territorial governments, to coordinate policy development, integrate regulatory frameworks, and improve service delivery.

Through this policy framework, DFO is committed to being both an enabler and a regulator of aquaculture development, affirming its role as a Department engaged in sustainable resource development. In this context “enabling” means improving the business climate for aquaculture development to benefit Canadians. DFO achieves this by:

- ensuring that DFO's laws and regulations relating to aquaculture are clear, efficient, effective, consistently applied and relevant to the sector;
- investing in aquaculture science and research and development;
- working in partnership with provinces and territories to develop a proactive siting process; and
- considering support for industry development programs consistent with DFO's mandate and objectives.

Further information regarding DFO's Aquaculture Policy Framework can be found at the following website: <http://www.dfo-mpo.gc.ca/aquaculture/ref/APF-PAM-eng.htm>.

2.2.2 National Aquaculture Strategic Action Plan Initiative

A strategy to support sustainable aquaculture growth and development has been set out in the *National Aquaculture Strategic Action Plan Initiative* (NASAPI) (2009). NASAPI was endorsed by the Canadian Council of Fisheries and Aquaculture Ministers (CCFAM) in November 2010 and outlines a strategic vision for the sustainable development of this sector, based on the principles of environmental protection, social well-being and economic prosperity.

The *National Aquaculture Strategic Action Plan* is available online here: <http://www.dfo-mpo.gc.ca/aquaculture/lib-bib/nasapi-inpasa/index-eng.htm>.

To achieve the overall vision, the plan includes three key areas for collaborative action:

- Governance,
- Social Licence and Reporting, and
- Productivity and Competitiveness.

In addition, five strategic action plans have been developed to support the Action Plan. The *National Aquaculture Strategic Action Plan Initiative: 2011-2015 - West Coast Marine Finfish* (2010) sets out specific actions related to supporting the growth of sustainable marine finfish aquaculture in BC. A copy of the *National Aquaculture Strategic Action Plan Initiative: 2011-*

2015 - *West Coast Marine Finfish* (2010) can be found at: <http://www.dfo-mpo.gc.ca/aquaculture/lib-bib/nasapi-inpasa/finfish-west-marin-ouest-eng.pdf>.

Flowing from NASAPI, DFO has been working through the National Aboriginal Fisheries Forum on an economic development initiative specifically targeting First Nations aspirations to participate in aquaculture. Additional information on this initiative is available through the Aboriginal Aquaculture Association at the following website:

<http://www.aboriginalaquaculture.com/>.

2.2.3 Sustainable Aquaculture Program

The Canadian aquaculture industry operates responsibly within rigorous environmental standards, the strongest in the world. These standards, based on the best available scientific research, are in place to safeguard the environment and wild fish stocks.

The Government of Canada undertakes numerous initiatives in order to secure a successful and sustainable aquaculture industry across Canada. These initiatives streamline the regulatory process, strengthen science to create performance-based environmental standards, spur innovation to enhance the sector's competitiveness and productivity, and support the development of certification schemes to meet rigorous quality standards in international markets.

The mission and guiding principles of the program are as follows:

- Regulatory Reform: Improved regulatory certainty through better coordination among federal, provincial and territorial governments,
- Scientific Research: Improved regulatory science to establish performance-based environmental standards for all aquaculture operations,
- Regulatory and Sustainability Reporting: Reporting on the environmental and economic performance of the sector.

2.2.4 British Columbia Aquaculture Regulatory Program

The British Columbia Aquaculture Regulatory Program was created to carry out the Department's responsibilities related to aquaculture in BC. In particular, the Program is designed to implement federal regulations under the *Fisheries Act* and carry out the day-to-day management of the fisheries and environmental aspects related to aquaculture in BC.

These responsibilities include a number of areas previously managed by the Province of British Columbia (until 2010) such as licensing, containment plans and fish health management plans, as well as matters which have historically been managed by DFO such as habitat protection, introductions and transfers of fish, and marine mammal interactions.

DFO's aquaculture-related responsibilities are managed by staff both at national headquarters in Ottawa and in the Pacific Region. The Program is primarily administered by DFO staff located in various communities on Vancouver Island and in Vancouver.

Within the Pacific Region, DFO is responsible for a range of aquaculture activities, including:

- developing operational policies and Integrated Management of Aquaculture Plans;
- reviewing licence applications, setting appropriate licence conditions, issuing licences and reviewing licensee/facility management plans;

- liaising with stakeholders, other governments and First Nations;
- reporting publicly on the performance of the aquaculture industry;
- conducting compliance evaluations for fish health and environmental protection;
- reviewing and analyzing environmental and compliance data; and
- evaluating the effectiveness of environmental protection.

Consistent with the legislative, regulatory and policy framework outlined above, DFO has identified the following as the key management objectives of the BC Aquaculture Regulatory Program:

- maintaining healthy and productive aquatic ecosystems;
- supporting an aquaculture industry that is environmentally, economically and socially sustainable;
- supporting economic opportunities through sustainable growth and development of the aquaculture sector in BC;
- ensuring sound environmental performance on the part of the aquaculture industry;
- providing an efficient and effective regulatory system for aquaculture in BC;
- supporting First Nations participation in aquaculture;
- meeting obligations related to First Nations consultation;
- engaging First Nations, industry, other levels of government and stakeholders in management of the aquaculture sector;
- taking an open and transparent approach to the management of aquaculture in BC; and
- maintaining a high level of compliance with DFO regulations and licence conditions.

DFO employs a range of management measures which support Departmental objectives related to aquaculture. These are intended to work in concert with the jurisdictions of other agencies with regulatory authority over aspects of aquaculture management such as the Canadian Food Inspection Agency under the *Health of Animals Act*. The primary tools DFO employs are aquaculture siting criteria and aquaculture licensing (including Conditions of Licence).

2.3 Compliance and Enforcement

Monitoring, audit and enforcement are an integral part of DFO's approach to management of the aquaculture industry. DFO's Conservation and Protection (C&P) staff (fishery officers) and other DFO staff play key roles in this approach.

The aquaculture C&P unit is a part of the aquaculture group and also part of the broader C&P sector in BC. The aquaculture C&P unit was established with the primary role of enforcing compliance with the *Fisheries Act* and the *Pacific Aquaculture Regulations*. Fishery officers responsible for aquaculture enforcement are stationed on Vancouver Island in Campbell River and Nanaimo.

DFO fishery officers conduct investigations and take enforcement actions based on C&P site inspections, inspections undertaken by DFO staff who monitor and manage industry reporting, or information from the public.

In collaboration with the enforcement activities conducted by fishery officers, DFO has a team of dedicated veterinarians, biologists, fish health technicians, and resource managers who verify that aquaculture facilities comply with the *Pacific Aquaculture Regulations* as well as all Conditions of Licence. The data gathered by DFO staff through site inspections and technical audits provides information related to the environmental and operational performance of the aquaculture industry in BC.

As a part of the BC enforcement approach, fishery officers perform three main enforcement activities:

- **Education and Shared Stewardship**: The Department promotes compliance with the *Fisheries Act* and the *Pacific Aquaculture Regulations* through education and awareness activities directed at both industry and the public. Public education and awareness activities encourage Canadians to protect fishery resources and habitats.
- **Monitoring, Control and Surveillance**: Enforcement activities are carried out by fishery officers who conduct regular patrols on the land, on the water and in the air. Fishery officers conduct inspections to validate licence reporting, and to determine compliance with aquaculture licences, Conditions of Licence and other applicable legislation.
- **Investigations**: Fishery officers respond to complaints and conduct investigations. Additional information about Fishery Officer duties is available on the DFO website: <http://www.dfo-mpo.gc.ca/fm-gp/enf-loi/description-eng.htm> .

2.4 Science in Support of Aquaculture

DFO undertakes a science-based approach while implementing the *Pacific Aquaculture Regulations* and the British Columbia Aquaculture Regulatory Program. DFO's scientific research informs regulatory decision-making. This research also improves our understanding of the interactions of farmed and wild finfish and shellfish, as well as the environment on which these species depend.

DFO is involved in a number of aquaculture science and research activities designed to:

- better understand and regulate the potential environmental interactions of aquaculture activities;
- develop new and enhanced tools and technologies to ensure optimal fish health; and
- establish sustainable, ecosystem-based practices.

Results of this research help inform regulatory and policy development and decision-making (within the Department and other government departments and agencies), and supports the responsible growth of Canada's aquaculture industry.

DFO's aquaculture research activities fall mainly under two key programs within the Sustainable Aquaculture Program: the *Program for Aquaculture Regulatory Research* (PARR), and the *Aquaculture Collaborative Research and Development Program* (ACRDP).

The PARR supports research activities that build understanding and the knowledge base that is used to inform DFO's aquaculture and fisheries protection regulations and policy decision-making. This includes the Department's ecosystem-based and environmental regulations. More

information on PARR can be found at the following website: <http://www.dfo-mpo.gc.ca/science/enviro/aquaculture/parr-prra/index-eng.asp>.

The ACRDP is a DFO initiative designed to increase the level of collaborative research and development activity between the aquaculture industry and the Department. The ACRDP teams industry with DFO researchers to undertake research that lies within DFO's mandate, but is based on the needs and priorities of the aquaculture industry. More information regarding ACRDP can be found at the following website: <http://www.dfo-mpo.gc.ca/science/enviro/aquaculture/acrdp-pcrda/index-eng.htm>.

Other related programs and activities include Science Peer Review (<http://www.dfo-mpo.gc.ca/aquaculture/sci-res/spr-eng.htm>), Canadian Integrated Multi-Trophic Aquaculture Network (<http://www.dfo-mpo.gc.ca/aquaculture/sci-res/imta-amti/index-eng.htm>), and Aquatic Animal Health Science (<http://www.dfo-mpo.gc.ca/science/aah-saa/index-eng.htm>).

The broad range of aquaculture research initiatives currently being undertaken by the Department, as well as other individuals and institutions (e.g.: universities, environmental groups, private consultants, First Nations), and those completed in recent years are summarized in the biennially published *Canadian Aquaculture Research & Development Review*. More information regarding the Review can be found at: <http://www.dfo-mpo.gc.ca/science/enviro/aquaculture/rd2013/index-eng.html>

The Department has undertaken a number of comprehensive science reviews that evaluated the state of knowledge and research needs in the area of aquaculture-environment interactions. These include:

- State of Knowledge Initiative (2003-2006): Peer reviewed reports examining the potential environmental effects of finfish (and shellfish) aquaculture activities including interactions between farmed and wild species (e.g.: disease transfer, genetic and ecological effects) and the impact of wastes (e.g. fate and effect of nutrient and organic matter release) (<http://www.dfo-mpo.gc.ca/science/enviro/aquaculture/index-eng.htm>).
- National Advisory Process: Finfish Aquaculture (2005). Coordinated through the Canadian Science Advisory Secretariat (CSAS), these processes reviewed the potential impact of aquaculture on fish habitat, environmental indicators of impacts at a range of spatial scales, and modeling techniques to predict these impacts: http://www.dfo-mpo.gc.ca/csas/Csas/status/2005/SAR-AS2005_034_E.pdf.
- Aquaculture Pathways of Effects (2009): This CSAS peer review process evaluated the state of knowledge associated with a broad range of potential aquaculture-environment interactions: http://www.dfo-mpo.gc.ca/csas-sccs/publications/sar-as/2009/2009_071-eng.htm.

In addition to these broad review processes, individual CSAS processes are routinely undertaken to evaluate emerging issues and science developments. The resulting Advisory Reports, as well as Research Documents and Proceedings documents, are posted on the CSAS website: <http://www.dfo-mpo.gc.ca/csas-sccs/index-eng.htm>.

The Department recognizes the importance of research on aquaculture-environmental interactions (and broader marine ecosystem and fisheries issues) that is conducted by individuals and institutions (e.g. universities, environmental groups, private consultants, First Nations). The

reports and publications resulting from these studies are also included and evaluated through CSAS review processes. This includes participation of external experts at CSAS peer review process workshops and active involvement in the formulation of Science Advisory documents.

2.5 Developing Science and Research Priorities

As advisory processes associated with aquaculture management in the Pacific Region develop, DFO will work collaboratively with First Nations, industry, and stakeholders to identify ongoing science and research priorities. Regional priorities will then be considered within a national context.

Nationally, aquaculture regulatory priorities for marine finfish aquaculture have consistently focused on the following themes:

- Fish Pest and Pathogen Treatment and Management Approaches (e.g. effects of sea lice management approaches, fish health zones);
- Cumulative Effects and Ecosystem Management Strategies (e.g. fish health zones, transfer zones, ecosystem assessment to support potential boundary delineation, cultivated/non-cultivated fish interactions);
- Habitat Impacts (e.g. aquaculture activity effects assessment for different cultivation types, assessment of dynamics of effects from increased deposition, far-field and cumulative issues);
- Interactions with Wild Populations (e.g. non-indigenous species assessment, cultivated stock escapes assessment, incidental catch evaluation, wild-cultivated interactions including sea lice).

The Department seeks input into science and research priorities through advisory committee processes. Science and research will benefit from the collaborative engagement of governments, First Nations, industry, and other stakeholders, working collaboratively to identify priorities and to carry out initiatives.

2.6 Integration of Traditional and Local Knowledge

In developing and implementing its aquaculture management approach, the Department is committed to working with First Nations, other levels of government, industry, and stakeholders in order to gather and integrate traditional and local knowledge. Through collaborative processes with First Nations and local communities, DFO will continue to improve its understanding of how traditional and local knowledge can be effectively utilized to improve the management of aquaculture.

2.7 Engagement and Advisory Processes

In order to facilitate open and transparent communication relating to the management of marine finfish aquaculture, DFO has worked with First Nations, industry, and other stakeholders to establish the Marine Finfish Aquaculture Management Advisory Committee (MF-AMAC). The MF-AMAC is a multi-stakeholder forum which is tasked with providing feedback to DFO on the coast-wide management of marine finfish aquaculture.

The MF-AMAC is a mechanism which brings together a range of interests related to aquaculture to provide coordinated analysis and advice to DFO with regard to aquaculture management in BC. AMACs provide a venue for discussion and dialogue, both between and among industry, First Nations, stakeholders, and local/provincial/federal governments. This advice plays an important role in the ongoing development of the MF-IMAP, and provides a transparent opportunity for interested groups to better understand and participate in the planning and management cycle for aquaculture.

DFO has also established bilateral processes with First Nations and the aquaculture industry. These processes complement, inform, and support work being done in the multi-stakeholder AMACs, and allow for more targeted discussions to identify and address specific issues.

Through programs like the Aboriginal Aquatic Resource and Oceans Management (AAROM) and the Pacific Integrated Commercial Fisheries Initiative (PICFI) programs, DFO has invested in building First Nations capacity related to aquaculture. These funds have been used to improve communications and information sharing among First Nations on aquaculture issues, and to provide technical capacity to help First Nations more effectively engage in discussions related to aquaculture management.

In addition to consultation and engagement with individual First Nations and other AAROM bodies, the Department continues to work closely with the First Nations Fisheries Council (FNFC) to seek advice and assist with coordination of engagement on a broader, province-wide basis. This includes progress toward the establishment of processes with First Nations which provide a vehicle for bilateral discussions, as well as support for effective First Nations engagement in the AMAC and other processes.

DFO aquaculture staff also participate in bilateral processes with other groups, including but not limited to: environmental non-governmental organizations, recreational fishing advisory boards, and commercial fishing industry advisory boards.

2.8 First Nations Consultation

Consultation with First Nations is a key part of DFO's aquaculture licensing and review process. Consistent with legal obligations and the federal duty to consult, DFO consults with First Nations on new licence applications and amendments where there is a potential to impact claimed and/or established rights and title.

Front Counter BC coordinates the receipt and distribution of information when an aquaculture application is submitted through the one-window approach. DFO works with the Province of BC and Transport Canada through a harmonized application and review process. Governments are working on a process whereby consultation with First Nations will be coordinated, where aquaculture-related authorizations are considered by the three agencies (DFO aquaculture licence, Provincial land tenure issued by the Province of BC, and/or Navigable Waters Permit issued by Transport Canada).

In addition to steps undertaken by the Department, DFO encourages aquaculture proponents (i.e. licence holders / applicants) to contact and engage First Nations prior to applying for a new licence or amendment.

In cases where an application relates only to a DFO area of jurisdiction (e.g. species amendment), the Department identifies First Nations in the area and provides them with a detailed overview (referral package) of the application and information regarding the proposed site and a proposed timeframe for comments/feedback on the application. First Nations are provided an opportunity for follow up through meetings and/or discussions. All comments are reviewed and carefully considered by the Department, including key issues and potential impacts identified by First Nations through the consultation process.

3. MANAGEMENT APPROACH

3.1 Federal-Provincial Roles and Responsibilities

The provincial government has a key role to play in the management of the aquaculture sector. In December 2010, DFO and the Province of BC signed an *Agreement on Aquaculture Management* which clearly defined federal and provincial responsibilities for the management and regulation of the aquaculture sector in BC. A copy of the agreement can be found on the DFO website: <http://www.dfo-mpo.gc.ca/media/infocus-alaune/2010/04/agreement-entente-eng.htm>.

This agreement lays out the primary roles of the federal and provincial governments related to aquaculture management. The primary responsibilities of the federal government (Fisheries and Oceans Canada) include:

- issuing licences for marine and freshwater aquaculture, including hatcheries;
- assessing modifications to existing aquaculture facilities;
- establishing licence conditions to conserve and protect fish and fish habitat;
- enforcing new aquaculture regulations;
- conducting science and aquaculture research; and
- reporting publicly on environmental and regulatory performance of industry.

The Province of British Columbia remains responsible for:

- issuing tenures for marine or freshwater environments;
- regulating the business aspects of aquaculture; (e.g., workplace health and safety); and
- reporting on seafood exports.

Flowing from the Agreement, DFO, Transport Canada and the Province of BC have been working to develop and implement a harmonized approach to aquaculture-related authorizations and decision-making. To simplify the application and review process for the aquaculture sector, the lead agencies have developed a harmonized application package for the collection of information necessary to apply for federal authorizations under the *Fisheries Act (Pacific Aquaculture Regulations)* and the *Navigable Waters Protection Act* and, to apply for provincial authorization under the *Land Act*.

The harmonized application package must be used for all aquaculture applications, including new marine finfish and amendment applications, where one or more of the above-noted authorizations are required.

Depending on the specifics of the application, there may be other authorizations required, (e.g. provincial Water Licence).

In addition to the harmonized application and review process, the lead agencies have also established a number of committees and working groups in order to support implementation of the Canada-BC Agreement.

3.2 Siting Considerations (Criteria)

Siting of marine finfish aquaculture facilities is an area of joint federal and provincial jurisdiction. The Province of BC is responsible for issuing tenures under the Provincial *Land Act*, which authorizes the use of space where an aquaculture facility will operate. DFO issues the aquaculture licence which allows the proponent to carry out the activity of aquaculture. Both DFO and the Province consider issues related to siting when reviewing applications for an aquaculture licence and tenure, respectively.

Below is a list of the current siting considerations assessed by BC and DFO in the review of marine finfish applications as part of the harmonized aquaculture application and review process (described above). These are also outlined in the harmonized application form for marine finfish aquaculture, available online at: <http://www.frontcounterbc.gov.bc.ca/apps/app71.html>.

In their review of applications for new marine finfish sites, DFO considers the following:

- proximity to significant salmonid-bearing streams (i.e. within 1 kilometre);
- proximity to a herring spawning area designated as “vital”, “major” or “high” importance (i.e. within 1 kilometre);
- proximity to intertidal shellfish beds that are exposed to water flows from a finfish farm and which have regular or traditional use by First Nations, recreational, or commercial fisheries (i.e. within 300 metres);
- proximity to all other wild shellfish beds and commercial shellfish growing operations (i.e. within 125 metres);
- appropriate distance from areas of “sensitive fish habitat” as determined by DFO;
- proximity to areas used extensively by marine mammals, as determined by DFO;
- potential impacts on important Aboriginal, commercial or recreational fisheries;
- proximity to existing finfish aquaculture sites (i.e. within 3 kilometres);
- consistency with Integrated Management of Aquaculture Plans.

For their part, the Province of BC considers the following:

- potential for infringement of riparian rights of an upland owner;
- consistency with local government by-laws related to land use planning and zoning or any relevant Coastal and Marine Plans;
- proximity to a First Nations reserve (i.e. within 1 kilometre);
- proximity to existing federal parks, regional district parks, provincial parks, marine protected areas and conservancies (i.e. within 1 kilometre);
- proximity to an ecological reserve smaller than 1000 hectares (ha) or approved proposals for ecological reserves smaller than 1000 ha;
- proximity to significant salmonid-bearing streams (e.g. within 1 kilometre).

The above siting-related considerations help BC and DFO identify potential siting issues, which may be addressed through discussion with the applicant and possible revisions to the application.

With respect to marine finfish aquaculture licences in the Discovery Islands Area (Fish Health Zone 3-2), decisions on applications for new marine finfish aquaculture licences, and for substantial amendments to existing marine finfish licences where there is a potential for a significant increase in the environmental footprint in the Discovery Islands area, will continue to be postponed until September 30, 2020. During this time, additional scientific research will be conducted and a new disease risk assessment process will be completed.

3.3 DFO Environmental Management Approach

The conservation of marine ecosystems and wild fish stocks is a priority for DFO. The *Fisheries Act*, *Fishery (General) Regulations*, and the *Pacific Aquaculture Regulations*, along with a comprehensive suite of related management tools (as outlined in this document), along with relevant science and research, provide the framework for the effective management of aquaculture in BC.

This regulatory framework allows DFO to effectively manage potential environmental impacts related to the cultivation of fish in the marine environment. Similar to the management of other fisheries, aquaculture facility licences provide very specific conditions and mandatory requirements that the aquaculture industry must meet in order to operate. Many of these conditions focus on the mitigation of potential impacts to the marine environment.

In addition to the marine finfish aquaculture Conditions of Licence and other regulatory tools, DFO has a robust environmental management approach aimed at identifying potential risks, including possible impacts on fish and fish habitat which support commercial, recreational and/or Aboriginal fisheries. Aquaculture in British Columbia is managed in a comprehensive manner, in order to ensure that the aquaculture industry in BC is sustainable and conducted in a manner that minimizes risk to wild fish and fish habitat.

DFO staff, including veterinarians, biologists and other aquaculture technical experts, support the development and implementation of the DFO environmental management approach. These staff work closely with aquaculture resource managers, Conservation and Protection staff (fishery officers), and the Science Branch in identifying and managing potential risks to the environment, as well as ensuring a high level of compliance with DFO regulations and Conditions of Licence. For example, DFO staff are responsible for:

- Identifying licence conditions aimed at strengthening environmental management;
- Conducting environmental audits and compliance evaluations for fish health and environmental performance (e.g. benthic monitoring, sea lice; marine mammal interactions);
- Reviewing and analyzing environmental and compliance data;
- Developing, producing and/or informing reports summarizing environmental performance and compliance information for public reporting purposes; and
- Evaluating the effectiveness of the management regime.

DFO staff complete a comprehensive schedule of site visits and environmental audits each year to ensure that industry-generated information and reports are accurate (e.g. sea lice count and benthic (seabed) monitoring). Staff also conduct targeted field operations (e.g. benthic impact,

by-catch, sea lice monitoring, marine mammal interactions, escapes) to better understand potential environmental impacts related to aquaculture, and to support the ongoing development of improved mitigation measures and best practices.

3.4 DFO Marine Finfish Aquaculture Licensing

Marine finfish aquaculture Conditions of Licence set out the specific operational and reporting requirements to which licence holders must adhere in order to operate legally and be in compliance with the *Fisheries Act* and regulations. The licence clearly defines the responsibilities of operators, and assures processors and consumers that they are buying seafood from a licenced, regulated facility. They contain provisions to ensure that aquaculture sites are operated in an environmentally sustainable manner that minimizes the risk to wild fish stocks and the marine resource.

Licences are issued for the operation of a specific aquaculture site, and licence holders must apply for renewal at the frequency specified in the Conditions of Licence. Since DFO assumed primary responsibility for the regulation and management of aquaculture in BC (December 2010), licences for marine finfish aquaculture have been issued on an annual basis (expiring on December 18 of each year). Companies and organizations with multiple sites must obtain a separate licence for each site.

The basic template for a marine finfish aquaculture licence, as well as the current generic Marine Finfish Aquaculture Conditions of Licence, can be found here: <http://www.pac.dfo-mpo.gc.ca/aquaculture/licence-permis/docs/licence-cond-permis-mar-eng.pdf>. In addition to the generic Conditions of Licence, site-specific Conditions of Licence may also apply based on the geographic location, the species being cultivated and the facility type.

3.4.1 Conditions of Licence – General Information

Together with the regulations, Conditions of Licence are used to regulate and govern the aquaculture industry in BC. Failure to comply with licence conditions can result in investigation and enforcement actions under the *Fisheries Act*. The licence conditions cover a broad range of elements relating to the operation of marine finfish facilities. They set out specific requirements regarding the scope and nature of permitted activities including:

- the fish species and biomass of fish that can be cultivated;
- what facilities must do to minimize and address fish escapes, marine mammal interactions and incidental catch of non-cultured fish;
- limits (thresholds) regarding impacts on the surrounding environment;
- monitoring;
- the development of, and adherence to, specific management plans;
- record-keeping and reporting to DFO; and
- the mitigative actions to be taken in response to specific events or incidents.

Below are more detailed summaries of key areas covered under the generic Conditions of Licence for marine finfish aquaculture in BC.

3.4.2 Licensed Species

These conditions specify the species of fish that are licensed for cultivation by the licence holder and the maximum biomass of fish to be held within the facility.

3.4.3 Transfer of Fish

These conditions specify requirements related to the routine transfer of fish to and from the aquaculture facility. The licence holder is authorized to transfer live Atlantic or Pacific salmonids between facilities (e.g. from a hatchery to a grow-out site) when specific conditions around permits, locations of the facilities, species of fish and fish health measures have been met. For example, both sites must have a valid DFO aquaculture licence and the fish must be transferred within the same Salmonid Transfer Zone.

Non-routine movements of fish (e.g. movements between Salmonid Transfer Zones) require separate introductions and transfers licences. These are issued following the *National Code on the Introductions and Transfers of Aquatic Organisms* which ensures that all genetic, ecological, and disease risks associated with movements of aquatic organisms have been adequately assessed and managed. Under the Code, the Canadian Food Inspection Agency (CFIA) plays the lead role in the management of disease risks.

3.4.4 Containment Array Requirements

These conditions specify requirements regarding the location and integrity of the containment array at the licensed facility. The licence holder is required to submit to DFO a containment array plan that includes the number and size of cages and locational information for each corner of the structure and proposed monitoring stations.

3.4.5 Fish Health

These conditions specify detailed requirements related to monitoring and management of fish health, which complement requirements under the *Health of Animals Act* and *Health of Animals Regulations* administered by the Canadian Food Inspection Agency (CFIA). The Conditions of Licence require licence holders to provide and comply with a detailed Health Management Plan (HMP); comply with carcass management as outlined in the HMP (or, in the case of non-salmon species, a separate Carcass Management Plan); and specific measures to be taken in the event of a “fish health event.” Such measures include taking actions to manage the event to minimize the potential spread of pathogens if an infectious disease is suspected or diagnosed; undertaking follow-up to evaluate the efficacy of the mitigation measures taken; storing records of the event and making them available for review by the Department; and submitting therapeutic management measures to DFO. DFO implements these management measures through the Conditions of Licence to minimize the risk of disease transfer and possible harm to wild fish populations, and to mitigate risks to the health of cultivated and wild fish stocks.

3.4.5.1 Fish Health Monitoring

DFO implements management measures through the Conditions of Licence which aim to minimize the risk of disease transfer and possible harm to wild fish populations. DFO imposes regulatory measures and programming in order to mitigate risk to the health of cultivated and wild fish stocks.

Under the Conditions of Licence, facilities cultivating salmonid species are required to develop and implement a Health Management Plan (HMP). The HMP addresses aspects of farming that

can affect the health of the animals within the aquaculture facility, and to minimize any potential impact on the health of the surrounding ecosystem.

Among other things, the HMP lays out the protocols to ensure cultivated fish are regularly monitored for signs of infection and disease. It includes protocols for keeping fish healthy, monitoring aspects of fish health, euthanasia, as well as procedures to record, store and submit fish health information. Facility operators are required to regularly report on losses. Conditions of Licence include detailed requirements related to fish health records, such as up-to-date records of stocking and fish health activity for the facility (including all use of therapeutants and anaesthetics); proving adequate training to all fish health staff in order to support accurate and consistent observations and record-keeping consistent with the HMP; ensuring that accurate records are kept regarding all Fish Health Events and carcass assessment records, and reviewed by the licence holder's veterinarian or fish health staff; and quarterly reporting to DFO regarding "Mortality by Cause."

Fish Health reports are reviewed by DFO veterinarians and assessed at the farm and area levels to detect departures from expected patterns and follow-up inquiry of the attending veterinarians, if indicated.

3.4.5.2 Sea Lice Monitoring

These conditions specify requirements for on-farm sea lice monitoring and associated reporting to the Department. Licence holders cultivating Atlantic salmon and trout are required to conduct sea lice monitoring every two weeks in the spring period. During this time the sea lice abundance must be maintained below a level of three motile *Lepeophtheirus* species (salmon lice) per cultivated fish. Should sea lice levels exceed this threshold the facility must notify DFO and initiate actions to reduce the absolute numbers of sea lice at the site.

Throughout the rest of the year, the Conditions of Licence require sea lice monitoring to be conducted once every month. In the event that the three motile *Lepeophtheirus* species threshold is exceeded during this period, the licence holder is required notify DFO, increase monitoring frequency to once every two weeks, and initiate management action to manage the on-farm sea lice levels.

For farm sites licensed to cultivate Pacific salmon, Conditions of Licence specify that on-farm sea lice monitoring is conducted during routine observations and handling of fish. As with the conditions for Atlantic salmon, should sea lice levels exceed the three motile lice threshold, the licence holder is required to provide a report to DFO.

3.4.5.3 Sea Lice, Health and Mortality Reporting

In addition to the conditions described above, this portion of the licence specifies the requirements for detailed sea lice, fish health and mortality reporting to DFO. Licence holders are required to provide: monthly reports on sea lice monitoring, abundance and management actions taken; quarterly reports on "mortality by cause," including any use of therapeutants and anaesthetics; immediate notification of any "mass mortality" events; and urgent notification and reporting of detailed information regarding any veterinary diagnosis or laboratory confirmation of diseases of regional, national, or international concern (see Appendix III of the Conditions of Licence).

Conditions of Licence lay out the sea lice monitoring program that operators in BC must follow. Detailed protocols are designed to ensure that sampling is random and representative of the

facility's entire fish population. Aside from very specific instances in which operators are exempt from regular monitoring activities (as outlined in the licence), operators are required to abide by these protocols. The results of licence holder's sea lice assessments are provided to DFO monthly. These data, along with DFO staff-conducted audit data, are posted quarterly on the DFO public reporting website.

3.4.6 Escape Prevention, Reporting and Response

These conditions specify requirements related to the prevention, reporting, and response to fish escapes. In addition to conditions requiring licence holders to take all reasonable measures to prevent escapes, specific conditions require all licence holders to have, and comply with, an Escape Prevention and Response Plan. In particular, the conditions require that licence holders take immediate action to control any escapes (or suspected escape); report the escape (or suspected escape) to the Department; and provide a report regarding the escape (or suspected escape) incident.

3.4.7 Incidental Catch

These conditions specify that the licence holder use reasonable care in using nets and other gear, in a manner that reduces the risk of incidental catch and causes the least amount of harm to those non-cultured fish caught as incidental catch. Specific conditions describe actions to be taken should any wild finfish be caught during the movement of fish, harvest of cultivated stock, or removal of net pens, together with reporting requirements. For example, live non-target species must immediately be returned to the water outside the facility in a manner that does the least harm. The licence holder is required to retain and record all dead wild finfish captured during the movement or harvest of fish or during net removal, and to dispose of them in a prescribed manner. Licence holders are also required to submit detailed incidental catch reports a minimum of every 24 months (for sites with fish continually on site) and within 14 days of removing a containment pen.

3.4.8 Marine Mammal Management

This section specifies conditions related to the management of marine mammal interactions and the requirement to have a Marine Mammal Management Plan in place. Specific conditions require that licence holders use reasonable methods to deter marine mammals (e.g. seals, sea lions) from coming into contact with the facility, and report to DFO any accidental drowning or other mortality of a marine mammal, as well as all reasonable attempts to free any live marine mammal entangled in the site's infrastructure. The use of acoustic deterrents is not permitted.

In the event that deterrent measures fail, the Conditions of Licence specify that the licence holder is permitted to kill Harbour seals and California sea lions which: represent an imminent danger to the facility (infrastructure) or human life; and are attempting to get within the containment array structure (and cannot be deterred by other means).

All marine mammal fatalities must be immediately reported to DFO. In addition, the licence holder must also submit to the Department a report of marine mammals killed under the authority of the licence within seven days of the event.

3.4.9 Protection of Fish Habitat

This section specifies the requirements to minimize, monitor and report on potential effects of the licensed facility on fish habitat. These include the maintenance of on-site records related to

in-situ removal of biofouling; prohibition of washing of copper-treated nets on-site (copper-treated nets are to be removed and washed at authorized land-based facilities). Additionally the Conditions of Licence lay out detailed requirements for monitoring the benthic environment (seabed) around the facility, together with specific actions the licence holder is required to undertake based on the results of that monitoring. For example the licence holder is required to conduct monitoring of the seabed at specific locations around the facility when the on-farm biomass is at peak (maximum) for a particular production cycle.

The type of monitoring required and parameters measured are dependent on the nature of the sea floor (e.g. grab samples for soft substrate, video monitoring for hard substrate). Thresholds are also in place to manage the location and extent of the footprint of the potential habitat impact on the seabed. For example, the licence holder is required to demonstrate that the benthic footprint of the facility is below specified thresholds prior to being permitted to restock the site for the next production cycle.

The Conditions of Licence also require licence holders to develop and implement a Chemical Use and Other Substances Management Plan which includes specific actions related to the management, control and spill response of therapeutants, disinfectants, pesticides, anti-fouling agents, hydrocarbons and blood.

Further, licence holders are required to submit, on an annual basis, a summary report including use of feed and names of all materials directly or indirectly released into the water during the reporting period.

3.4.10 Use of Lights

These conditions specify the reporting requirements for the use of lights on the licensed facility including the type, number and intensity of lights used, as well as dates and times when the lights are in use. This information is submitted to the Department on an annual basis.

3.5 Management Priorities

In addition to the management tools and measures outlined above, DFO has identified issues and areas that continue to be addressed. These priorities have been informed by both science work and consultation and engagement with First Nations, industry, stakeholders and others.

In most cases, the Department has already implemented measures to address these priorities (e.g. fish health, sea lice, benthic impacts) on a coast-wide basis, by area or on a site-by-site basis. At the same time, the Department is taking an adaptive approach to its management of these issues and is looking to engage First Nations, industry, stakeholders and other levels of government with respect to these approaches.

It is anticipated that this list of management priorities will be revised and updated over time, based on new science and/or engagement with various groups and interests. In particular, the MF-AMAC and bilateral aquaculture processes with industry and First Nations will be key vehicles for discussing and evaluating potential changes to our management approach.

The following management priorities and initiatives have been identified by the Department:

- Sea Lice,
- Fish Health and Wild-Farmed Fish Interactions,
- Siting Considerations,

- Licence Fees and BCARP Service Standards,
- Multi-year Licences, and
- Area-Based Management.

The following section provides a brief overview of the management issue, DFO's current management approach and potential considerations moving forward.

3.5.1 Sea Lice

Sea lice control measures in aquaculture are strictly regulated, monitored and managed to ensure that there is mitigation in place to minimize risks associated with sea lice abundance in BC's coastal ecosystem. DFO intends to work with industry and other partners to further improve aquaculture management through the development of an Integrated Pest Management Approach. This Approach will emphasize area-based management, potential adjustments of 'trigger abundances' to guide management actions, and more consideration of alternative control measures (or tools), such as low-risk bath techniques to manage sea lice in aquaculture facilities, while ensuring that marine ecosystems remain safe and healthy.

3.5.2 Fish Health and Wild-Farmed Fish Interactions

DFO is committed to managing aquaculture in a manner which protects the health of wild and cultivated stocks in BC. Although the current and active health monitoring programs of BC's aquaculture industry and DFO's Aquaculture Management Division are extensive and comprehensive, as new science-based information arises, regulatory and industry health programs can adjust and improve accordingly.

In addition, the analysis of data and the development of useful fish health summaries is anticipated to become more efficient and automated in the future which will improve the timeliness and relevance of public reporting.

3.5.3 Siting Considerations

As outlined above, DFO and the Province of BC have established a number of siting considerations which are assessed by federal and provincial staff in the review of new marine finfish aquaculture licence applications.

In some cases, these criteria have been in place for a number of years and pre-date the changes in regulatory responsibilities for aquaculture in BC. In light of these changes, as well as new scientific information and other factors, DFO plans to undertake a review of the current siting considerations for marine finfish aquaculture. The Department anticipates this review will be informed by additional science, traditional and local knowledge, other information and consultation with First Nations, industry, stakeholders and other levels of government. No specific timeframe has been set for this review; however, work will likely be initiated in 2013-14 and carry forward into 2014-15.

3.5.4 Licence Fees and BCARP Service Standards

DFO is currently in the process of establishing licence fees to be charged for aquaculture licences in BC. Due to the requirements of the *User Fees Act*, licence fees have not been charged since DFO became the regulatory authority for aquaculture in 2010. Following development and consultations on the subject, licence fees are expected to come into force for

the 2014 licence renewal period. Service standards have also been developed by DFO and will come into effect when licence fees come into force.

3.5.5 Multi-year Licences

The aquaculture industry has identified multi-year licences in BC as a priority for regulatory reform, stating that short-term licences contribute significantly to investment uncertainty, increase business planning challenges, and contribute to higher loan and capital costs.

The *Fisheries Act* permits licence durations up to nine years. In considering and consulting on changes to licence durations for all types of aquaculture facilities in BC, DFO expects to examine issues of annual payments of fees, maintaining DFO's ability to be able to modify Conditions of Licence as appropriate over time, and maintaining transparency in regulatory requirements.

3.5.6 Area-Based Management

DFO's aquaculture management approach in BC is framed by a number of policies, regulations and management measures. To a large extent, these are developed and applied at either a province-wide scale or on a site-by-site basis. Given the unique context and diverse coastline in BC, the Department is looking at opportunities to move toward an area-based approach. For example, these approaches could include the identification of smaller geographic areas or ecosystems (management zones) that would then form the basis for a more localized planning process, including area-based management measures and objectives (e.g. sea lice, fish health), additional siting considerations, research, and/or socio-economic considerations.

These options and an eventual approach will be informed by additional science, local and traditional knowledge, as well as consultation with First Nations, industry, stakeholders and other levels of government. No specific timeframe has been set for this exercise and progress will largely depend on available resources and capacity, both for DFO and our partners.

4. REPORTING ON RESULTS

DFO has committed to an open and transparent approach to the management of aquaculture in BC. In part, the Department works to achieve this objective through the regular release of information reported by the aquaculture industry and data gathered through DFO's own environmental monitoring and fish health programs.

4.1 Public Reporting

Providing access to relevant and transparent information is an important component of aquaculture management in BC. The Conditions of Licence for marine finfish aquaculture require licence holders to submit a number of reports on a regular basis which relate to ongoing facility operations. Information contained in many of these reports is released publicly by DFO through its aquaculture public reporting website. In addition to the review of information submitted by industry, both DFO aquaculture staff and the dedicated Conservation and Protection unit provide audit and compliance monitoring and inspections. Publicly released information for marine finfish aquaculture is available on the DFO website: <http://www.pac.dfo-mpo.gc.ca/aquaculture/reporting-rapports/index-eng.html>.

The following types of information are made publicly available:

- General Licence Information – The general marine finfish aquaculture Conditions of Licence are provided on-line. More detailed conditions may be added to a licence on a site-specific basis or within a particular geographic area.
- Licence Holder Information – Information includes licence holder/operating party name, site and general location, species licensed for cultivation and maximum allowable peak biomass.
- Importation of Salmon Eggs
- Escapes – Site by site reports including number of fish
- Marine Mammal Interactions – Site by site reports of authorized predator control, as well as reports on marine mammal accidental drownings by species
- Sea Lice Counts – Data provided by industry and DFO staff audits
- Incidental Catch – Site by site reports on incidental catch numbers by species
- Benthic Monitoring – Quarterly reporting of industry-generated data, and annual results of DFO site audits and reports
- Use of lights at aquaculture facilities
- Fish Transfer Information – Summary data reflecting the number of stock transfers within and from without the Pacific Region fish transfer zones

In addition, every aquaculture licence holder is required to submit an annual Aquaculture Annual Statistical Report which provides additional information relating to the performance of the aquaculture industry in BC. Information from these reports provides DFO, other government bodies, industry, First Nations, and other stakeholders with a clear picture of the performance of the marine finfish aquaculture industry.

4.2 Evaluation of Performance

DFO is committed to a process of adaptive and continuous improvement in the management of marine finfish aquaculture. The MF-IMAP sets out general direction and guidance with respect to management objectives, management measures, and public reporting/industry performance. The management of aquaculture takes place within a broader framework of the objective of ensuring sustainability of the aquaculture industry by the Government of Canada.

As the marine finfish aquaculture management framework continues to develop, information gained through reporting required by the Conditions of Licence, information compiled from the Aquaculture Annual Statistics Report, along with DFO collected data, will be used to assist in ongoing reviews of both the performance of marine finfish industry and the marine finfish management framework.