

PACIFIC REGION MARINE FINFISH INTEGRATED MANAGEMENT OF AQUACULTURE PLAN

July 2016 – Version 2.1



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 the management of marine finfish aquaculture in British Columbia, as well as the measures used to meet these objectives. This document provides federal and provincial agencies, local government, industry, First Nations, stakeholders and the public with an overview of marine finfish aquaculture operations in British Columbia and how the industry is managed by Fisheries and Oceans Canada.

The MF-IMAP will be reviewed periodically to incorporate changes in the management approach and to ensure that it includes the most current information available in relation to science, policy and management practices.

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*, the *Aquaculture Activity 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.

Please note that attempts are made to keep the internet-based links provided in this paper up to date, however providers do change their web addresses regularly and inevitably the reader will find some links which no longer work. Please report broken links to IMAPs@dfo-mpo.gc.ca.

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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. 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 of British Columbia. Under the authority of the *Fisheries Act*, the *Pacific Aquaculture Regulations* (<http://laws-lois.justice.gc.ca/eng/regulations/SOR-2010-270/>) and on a national level the *Aquaculture Activity Regulations* (<http://laws-lois.justice.gc.ca/PDF/SOR-2015-177.pdf>) were developed under the *Fisheries Act* to govern the management and regulation of the aquaculture industry. 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 governing the regulation of the aquaculture industry, other federal departments and provincial agencies also have roles in managing and regulating various aspects of aquaculture management in British Columbia. For example, 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, 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 fish in a marine environment. Fish are considered 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.

In addition to the *Pacific Aquaculture Regulations*, which pertain only to aquaculture sites in British Columbia, the *Aquaculture Activity Regulations* provide nationally consistent conditions under which aquaculture operators may treat their fish for pests and pathogens, as well as deposit organic matter (e.g. fish feed and feces), while ensuring the protection of fish and fish habitat and sector sustainability. The *Aquaculture Activity Regulations* were designed to align policies across federal and provincial regulatory jurisdictions related to the operations of aquaculture facilities. The *Aquaculture Activity Regulations* provide operational certainty across Canada, while ensuring environmental protection and reporting.

The MF-IMAP outlines the overall management framework for marine finfish aquaculture in British Columbia, as well as current management priorities. The process of cultivating finfish throughout a life cycle may fall under more than one IMAP (e.g. freshwater/land-based and marine finfish). 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 feedback to DFO regarding the management of aquaculture in British Columbia. The marine finfish Aquaculture Management Advisory Committee (MF-AMAC) is an advisory body which was established in 2013. The MF-AMAC terms of reference provides seats for First Nations, marine finfish aquaculture licence holders, industry associations, environmental interests and local government. DFO and the Government of British Columbia are ex-officio participants of the committee. The Terms of Reference for the MF-AMAC, along with contact information and a schedule of meetings, are available through the DFO Pacific Region website: <http://www.pac.dfo-mpo.gc.ca/consultation/aquaculture/index-eng.html>.

The MF-AMAC provides advice and recommendations to DFO with respect to the management of marine finfish aquaculture in British Columbia. The committee reviews the MF-IMAP on a regular basis.

In addition, DFO undertakes bilateral consultation with individual First Nations, and works with the First Nations Fisheries Council in order to engage British Columbia First Nations in discussions related to aquaculture management and decision-making. The Department also meets with other organizations through bilateral processes to engage these constituent groups in discussions related to the management of aquaculture in British Columbia.

1.2 Sector Overview

DFO currently licenses approximately 116 marine finfish aquaculture facilities with a total combined allowable peak biomass of approximately 282,975 tonnes.¹ Generally about 60% 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 cultivated fish in British Columbia. Other marine finfish being actively farmed on a commercial basis in British Columbia, all indigenous to the Pacific coast of Canada, include: chinook salmon (*Oncorhynchus tshawytscha*); coho salmon (*Oncorhynchus kisutch*); rainbow/steelhead trout (*Oncorhynchus mykiss*); and black cod (*Anoplopoma fimbria*), also known as sablefish.

Copper rockfish and wolf eel are cultivated on a smaller scale and are currently 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 British Columbia waters. Between 1905 and 1935 there were a number of attempts to introduce Atlantic salmon to British Columbia rivers for recreational fishing purposes, but these were unsuccessful. The Atlantic Salmon Watch Program was

¹ This total includes the total allowable biomass of all existing licences, including those sites which are not currently in production and those used for broodstock or transfer purposes

established in 1991 to document sightings and captures of Atlantic salmon in British Columbia waters. Although targeted stream surveys have been undertaken in areas where the presence of Atlantic salmon has been reported, or might have been most probable to occur, research has not yielded data showing that there are any feral Atlantic salmon populations (regenerating in the wild) in British Columbia. A related published paper is available online: <http://www.dfo-mpo.gc.ca/Library/357053.pdf>. Members of the public who feel they may have found an Atlantic salmon should report their catch to 1-800-811-6010 or aswp@pac.dfo-mpo.gc.ca.

1.2.2 Cultivation Methods

Marine finfish aquaculture operations have infrastructure both below and above the water surface. Facilities consist of containment structures (net pens) typically comprised of between ten and fourteen square or circular cages which may be surrounded by metal walkways. Square cages are generally 30m X 30m and the diameter of circle cages is generally 90m or 120m.

Containment structure arrays are held in place by a series of anchors and lines which radiate out from the infrastructure. Containment nets must be regularly inspected, repaired and tested to ensure they are in good repair and strong enough to prevent fish escapes, with mesh sizes that vary depending on the size of fish being reared at a facility. Predator netting is often attached around the containment nets to discourage marine mammals and other predatory fish (e.g. dogfish) from trying to gain access to the fish on the site.

The majority of facilities have associated infrastructure including an office, a fish health/phytoplankton lab, space for a generator, 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 British Columbia and Sechelt Inlet.

In addition to typical marine-based finfish facilities, there is one multi-trophic aquaculture facility in British Columbia which cultures seaweeds, shellfish and finfish at the same facility.

1.2.3 Aquaculture Operations and Characteristics

Pacific salmon have been cultivated at freshwater hatcheries in British Columbia 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 British Columbia, importing eggs from domesticated stock in Europe. Today, most aquaculture companies harvest eggs from their own fish which have been reared in British Columbia 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 local 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>).

Licenses may apply for an introductions and transfers licence to import eggs from outside of Canada. Imported eggs must meet stringent requirements as set out by the Canadian Food Inspection Agency, the federal regulatory authority on disease risk management of fish imports. 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, self-sustaining 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/management-gestion/licen-permi-eng.htm>.

The life cycle of a cultivated salmon begins in a freshwater hatchery. As fry emerge from their eggs, they are transferred into troughs or tanks, where they are provided with a continuous flow of water and 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 online: <http://www.pac.dfo-mpo.gc.ca/aquaculture/licence-permis/fresh-douce-eng.html>.

Juvenile fish are generally kept in a controlled setting to provide optimal growing conditions and protection from disease and predation. Vaccination occurs in the juvenile stage, most commonly by injection, prior to transfer from the hatchery to the open marine environment or to land/marine containment facilities.

There are several different types of marine sites. Broodstock sites usually hold a relatively small number of adult fish for breeding; typically 5,000 to 50,000 fish. Smolt-entry sites may hold up to 1.5 million fish at a time. These fish are then moved to grow-out sites. The most common type of site is one where fish enter as smolts and remain until they are ready to be harvested. The number of salmon grown at a marine finfish aquaculture facility of this kind during a typical production cycle ranges from around 200,000 to 650,000 with a peak biomass of several thousand tonnes.

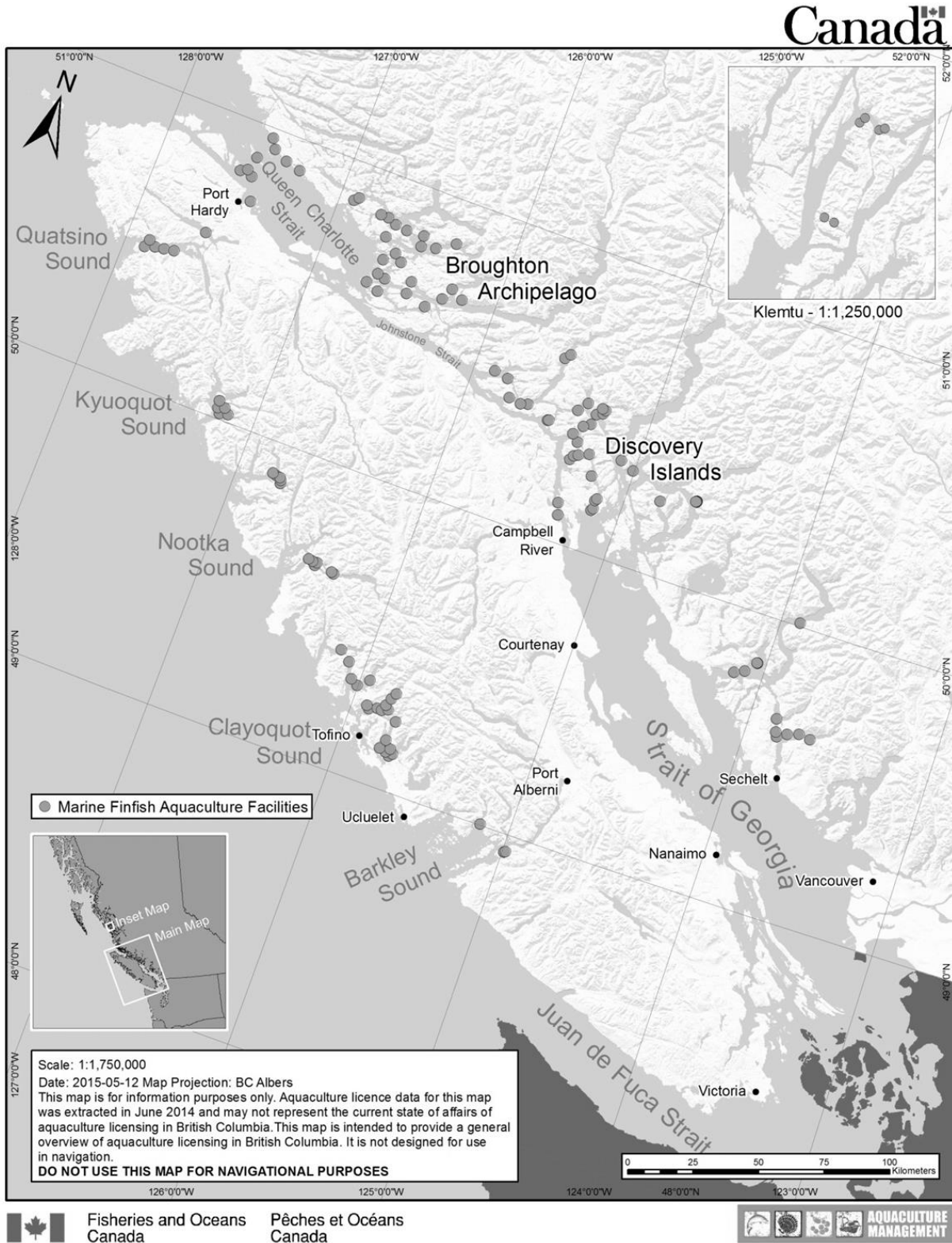
Good husbandry practices discourage frequent handling of fish as this increases stress on the animals and can have a negative impact on their health. Fish are often graded (separated according to size and maturity) when they enter a facility so that fish in various pens/tanks will be ready for harvest around the same time and will not require further handling. At harvest fish are removed from the facility and transported either alive or dead to processing plants.

A production cycle, including broodstock selection, hatchery production, grow-out schedules and other factors, can take up to five years. 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.

Additional information relating to the management and licensing of facilities dealing with the early life stages of marine finfish is available in the freshwater/ land-based Integrated Management of Aquaculture Plan.

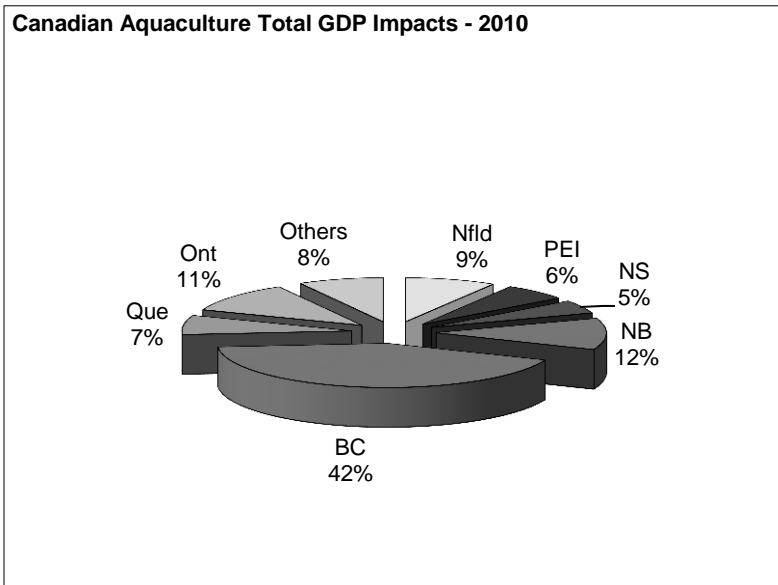
1.2.4 Locations of Licensed Aquaculture Facilities

Most marine finfish aquaculture sites in British Columbia are located 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), Sechelt Inlet, and British Columbia's Central Coast. The map below provides an overview of the locations of marine finfish aquaculture sites licensed in May 2015.

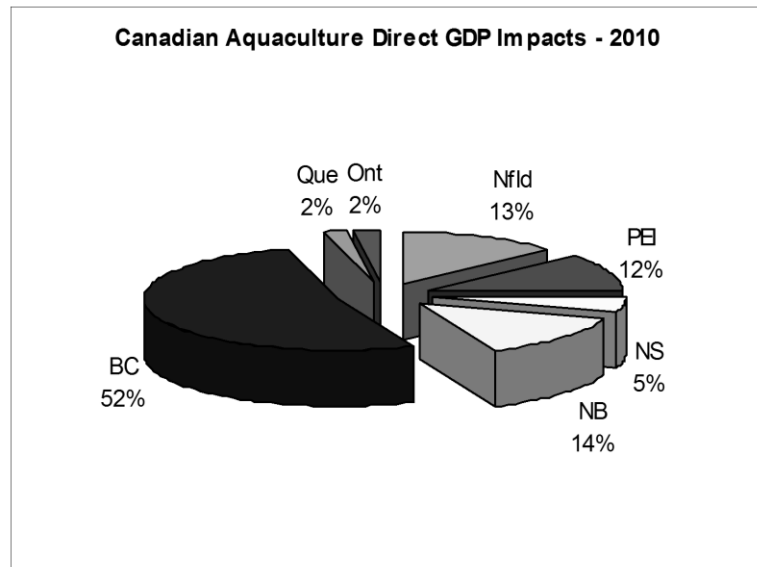


1.3 Economic Profile of the Aquaculture Industry

Canada is the 26th largest producer of aquaculture products in the world and the fourth largest producer of salmon after Norway, Chile and the United Kingdom.² Aquaculture production occurs across Canada, with the bulk of production occurring in the Atlantic provinces and British Columbia. In 2013, Canadian aquaculture production had a farmgate value of almost \$1.0 billion.³ Finfish accounted for about 90% of the value. The British Columbia aquaculture industry is the largest in Canada, with producers accounting for 55% of Canadian finfish value (\$0.9 billion).



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.⁴ In 2010 (the last year for data is available), the direct contribution to Canadian GDP from aquaculture was about \$354 million, of which \$185 million was in British Columbia (0.09% of the British Columbiatotal GDP). The indirect effect was an additional \$464 million



in Canada and \$173 million in British Columbia. The induced effects added \$246 million to Canadian GDP, \$95 million of which was in British Columbia. The overall impact on the GDP

² Food and Agriculture Organization of the United Nations (FAO). Global Aquaculture Production 1950-2013. Online dataset available at: <http://www.fao.org/fishery/statistics/global-aquaculture-production/en>. Accessed: July 2015.

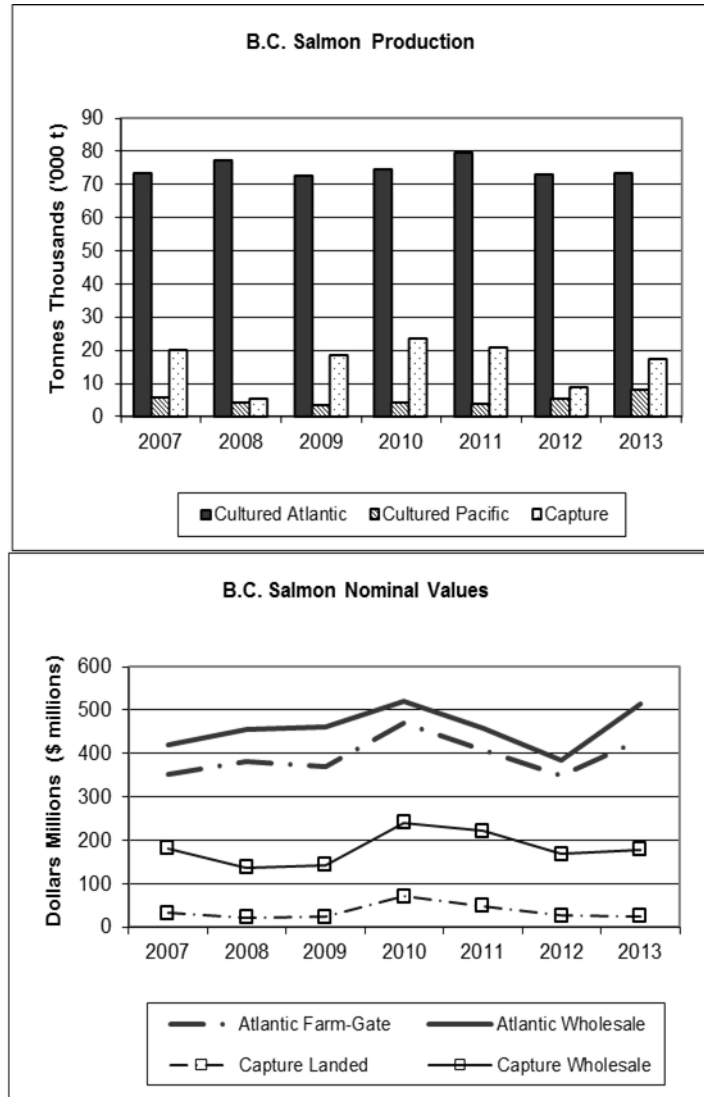
³ Fisheries and Oceans Canada (DFO). 2013. Socio-Economic Impact of Aquaculture in Canada, 2013 Edition. Available at: <http://www.dfo-mpo.gc.ca/aquaculture/sector-secteur/publications-eng.htm>. Accessed: August 2015.

⁴ 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.

of Canada was \$1.1 billion (0.07% of total Canadian GDP), of which \$452 million was in British Columbia (0.21% of total British Columbia GDP). British Columbia 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, including: quantity produced (tonnes), farm-gate value,⁵ final product value,⁶ and wholesale value.⁷ 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. However, data on final product values are not updated on a regular basis. 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 2013, British Columbia produced almost 75% of Canada's cultivated salmon, with the remainder produced by New Brunswick (19%) and Nova Scotia (7%).⁸ Salmon accounts for about 99% of British Columbia's finfish aquaculture and averaged production of almost 80,000 tonnes between 2009 and 2013, which is more than four times the capture salmon harvest average. Almost 94%



⁵ 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.

⁶ 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).

⁷ 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.

⁸ Source of data is Statistics Canada (Cat. No 23-22-X). Data is available at: <http://www.dfo-mpo.gc.ca/aquaculture/sector-secteur/stats-eng.htm>. Accessed: August 2015.

of British Columbia's marine finfish aquaculture production is Atlantic salmon and about 5% is Pacific salmon, which includes chinook, coho, and steelhead.⁹ Sablefish, (also known as black cod) is grown on a relatively small scale; other cultivated finfish are in freshwater (e.g. sturgeon, tilapia and rainbow trout). Within British Columbia 78% of farmed salmon is produced under agreement with First Nations.¹⁰

The economic contribution of cultivated salmon to the GDP of British Columbia has exceeded the contribution of all the salmon capture fisheries since 1996, as the percentage of the market occupied by capture fisheries declined and the salmon aquaculture market share grew.¹¹

Cultivated salmon now account for about 59% of the landed/farm-gate value of seafood in British Columbia and approximately 42% of the wholesale value.¹² On average between 2009-2013, the total wholesale values for Atlantic salmon were slightly more than double that for all capture salmon combined, while farm-gate value has been more than ten times that of landed value.

1.4 Employment

Most salmon farming jobs in British Columbia are full-time, year-round, and located between Comox and Port Hardy, along the corridor created by Vancouver Island and the mainland. There are also a number of fish processing plants in the area to handle aquaculture products, although the employment impacts from processing aquaculture products are relatively low. This appears to be due to the fact that 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. Additionally, much of British Columbia 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).

The aquaculture labour force is young in comparison to capture fisheries. In British Columbia, people under 40 years of age hold about 60% of aquaculture jobs, compared with only 30% of positions in the capture fishery.¹³ 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. About 30% of the workforce at facilities is comprised of First Nations.¹⁴

Statistics Canada estimated that the aquaculture sector in British Columbia employed an average of 1,700 people in both 2010 and 2011, although given the small size of the industry these numbers should be viewed with caution. Income declined by 5% from \$58.5 million in 2010 to \$55.7 million in 2011.¹⁵

⁹ British Columbia Ministry of Agriculture. Various years. British Columbia Seafood Year in Review. Years 2012 and forward available at: <http://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/about-agriculture-and-seafood-in-bc/statistics/industry-and-sector-profiles>. Years 2011 and earlier available at: <http://www.env.gov.bc.ca/omfd/reports/#STATPUB> Accessed: August 2015.

¹⁰ Economic Opportunities for Aboriginal Aquaculture in Western and Central Canada, Aboriginal Aquaculture Assoc. March 31, 2015.

¹¹ 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.

¹² British Columbia Ministry of Agriculture. 2014. British Columbia Seafood Year in Review 2013.

¹³ Statistics Canada, 2008 Tax filer data, DFO special run.

¹⁴ Economic Opportunities for Aboriginal Aquaculture in Western and Central Canada, Aboriginal Aquaculture Assoc. March 31, 2015

¹⁵ BC Stats. 2013. British Columbia's Fisheries and Aquaculture Sector, 2012 Edition.

Table 1: Estimates of Employment impacts in 2010 by total aquaculture and salmon aquaculture in British Columbia, based on estimates of revenues and using multipliers (BC Stats 2013) (Prod = primary production, Proc = processing facilities). Jobs are measured in number of employees, and income is measured in thousands of dollars (nominal).

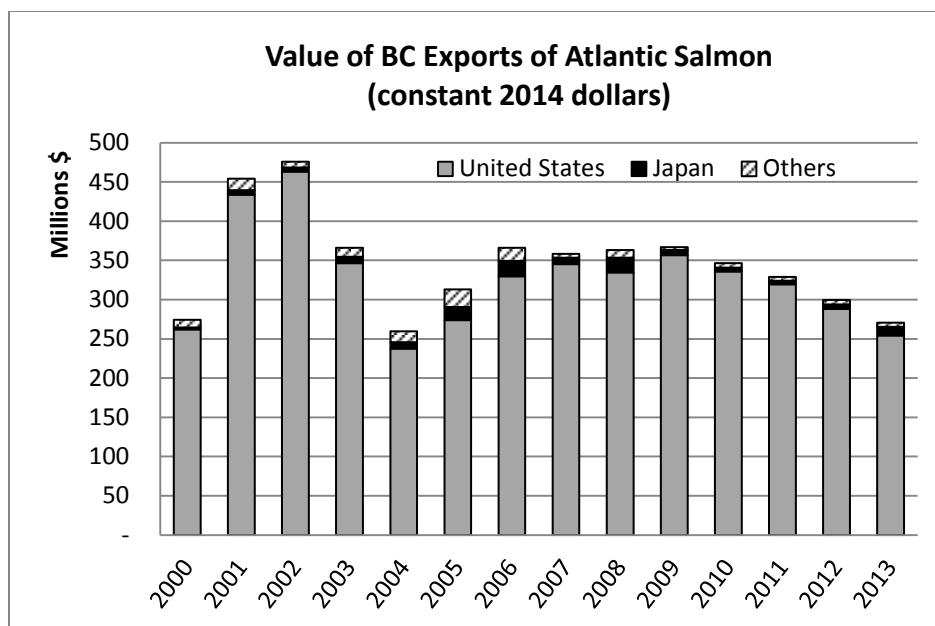
| | Total Aquaculture | | | | Salmon Aquaculture | | | |
|----------|-------------------|-------------|-------------|-------------|--------------------|-------------|-------------|-------------|
| | Jobs | | Income | | Jobs | | Income | |
| | <i>Prod</i> | <i>Proc</i> | <i>Prod</i> | <i>Proc</i> | <i>Prod</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 |

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 million in wages and 400 person-years of employment annually, which comprises a significant portion of the local economy.¹⁶

1.5 Markets and Prices

The main product for British Columbia farmed salmon is chilled/frozen gutted/headed whole fish with an export value of \$7.85/kg in 2014. Processed products such as fresh fillets received nearly \$15/kg but they only comprise a small share of exports (less than 2% of volume exported from 2009-2013). The main markets for British Columbia aquaculture are the domestic market (approximately 55% of British Columbia wholesale value), the United States (approximately 42% of British Columbia wholesale value) then, a distant third, Japan (in 2014).

¹⁶ “The *Marine Economy & the Regional District of Mt. Waddington*” prepared for the Living Oceans Society and Regional District of Mt. Waddington, March 2011.



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.¹⁷ 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. LEGISLATION, GOVERNANCE & POLICY FRAMEWORK

2.1 Legislation and Mandate

The Department of Fisheries and Oceans Canada's (DFO's) aquaculture management approach in British Columbia 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, ecological, social and economic fisheries interests in oceans and fresh waters. For the purposes of aquaculture in British Columbia, 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

¹⁷ Knapp, Gunner. 2013. Trends in Alaska and World Salmon Markets. Available: <http://www.iser.uaa.alaska.edu/people/knapp/personal/> Accessed: August 2013.

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

DFO's Role: The Department:

- supports strong economic growth in our marine and fisheries sectors by supporting exports and advancing safe maritime trade;
- supports innovation through research in expanding sectors such as aquaculture and biotechnology; and
- contributes to a clean and healthy environment and sustainable aquatic ecosystems through habitat protection, oceans management, and ecosystems research.

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.

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 includes issues related to zoning.

2.2 Regulations

The *Fishery (General) Regulations*, (FGR) the *Pacific Aquaculture Regulations* (PAR) and the *Aquaculture Activities Regulations* (AAR) are the principle regulations governing marine finfish aquaculture in British Columbia. Under these regulations DFO has established a licensing regime which is consistent with other fisheries managed by the Department, yet tailored to address the unique characteristics of the aquaculture sector.

Licence conditions are developed to provide a management approach for aspects of aquaculture managed federally that relate to facility operations (e.g. site operations, introductions and transfers of fish, marine mammal interactions, and incidental catch).

The AAR, enacted in July 2015, governs the deposition of substances required to treat pests and disease and the deposition of organic matter. PAR Conditions of Licence previously in place since 2010 dealing with these aspects of aquaculture have now been removed and are now outlined within the AAR. The overall management of the deposition of deleterious substances and of benthic impacts has remained very similar through this transition, as mitigation, monitoring, performance thresholds and reporting requirements have all remained in place.

2.3 Policies

Legislation and regulation provide a legal framework for the management of aquaculture, while Departmental policies and operational approaches provide more specific context and detail in terms of how that authority is translated into management.

The Fisheries and Oceans Canada 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*.

2.3.1 Fisheries and Oceans Canada Aquaculture Policy Framework

DFO's vision for aquaculture development is to benefit Canadians through the culture of aquatic organisms while upholding the ecological and socio-economic values associated with Canada's oceans and inland waters. As the lead federal agency for aquaculture development, DFO is guided by the principles of the Aquaculture Policy Framework, including:

- 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>.

2.3.2 Sustainable Aquaculture Program

The Canadian aquaculture industry operates within rigorous environmental standards, some of 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 to ensure 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 objectives of the renewed Sustainable Aquaculture program (2013 – 2018) are as follows (<http://www.dfo-mpo.gc.ca/aquaculture/programs-programmes/sustainable-durable/renewed-renouvele-eng.htm>):

- Regulatory Science: Improved science knowledge and advice to inform regulatory decision-making and policy development;
- Regulatory Reform and Governance: Improved regulatory certainty through better coordination among regulatory authorities; and
- Aquaculture Public Reporting: Improved reporting on the environmental and economic performance of Canada's aquaculture sector.

2.3.3 British Columbia Aquaculture Regulatory Program

The British Columbia Aquaculture Regulatory Program was established to carry out the Department's responsibilities related to aquaculture in British Columbia. In particular, the Program was 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.

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 management objectives:

- 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 British Columbia;
- ensuring sound environmental performance on the part of the aquaculture industry;
- providing an efficient and effective regulatory system for aquaculture in British Columbia;
- 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 British Columbia; 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 considerations, aquaculture licensing (including Conditions of Licence), required site monitoring, a DFO audit program, and compliance and enforcement measures.

2.4 Compliance and Enforcement

Monitoring, auditing and enforcement are integral parts of DFO's approach to the management of the aquaculture industry. Conservation and Protection (C&P) staff (Fishery Officers) and other DFO employees play key roles in this approach.

A specialized aquaculture C&P unit enforces compliance with the *Fisheries Act*, the *Pacific Aquaculture Regulations*, and the *Aquaculture Activity Regulations*. Fishery Officers responsible for aquaculture enforcement are stationed on Vancouver Island in Campbell River and Nanaimo.

DFO Fishery Officers conduct investigations and may initiate enforcement actions based on C&P site inspections, inspections undertaken by DFO staff who monitor and manage industry reporting, or on information received 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* and the *Aquaculture Activities Regulations* as well as all Conditions of Licence. The data gathered by DFO staff through site inspections and technical audits provides valuable information related to the environmental and operational performance of the aquaculture industry in British Columbia.

2.5 Science in Support of Aquaculture

DFO undertakes a science-based approach to managing the aquaculture industry in British Columbia. In addition to supporting regulatory decision-making, scientific research also improves the Department's understanding of the interactions between 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 support 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 environmental regulations. Information on the PARR can be found at the following web location: <http://www.dfo-mpo.gc.ca/science/environmental-environnement/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/index-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 industry), are summarized in the biennially published *Canadian Aquaculture Research & Development Review*. The most recent Review (2015) can be found at: <http://www.dfo-mpo.gc.ca/science/environmental-environnement/aquaculture/rd2015/index-eng.html>.

The Department has undertaken a number of comprehensive science reviews evaluating the state of knowledge and research needs in the area of aquaculture-environment interactions. 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.

2.6 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 research priorities for marine finfish aquaculture have consistently focused on the following themes:

- Fish Pathogen and Pest 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 and bilateral engagement processes. Science and research, as well as the management of the industry, will benefit from the collaborative engagement of governments, First Nations, industry, and other stakeholders, working together to identify priorities and carry out initiatives.

2.7 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 continues to improve its understanding of how traditional and local knowledge can be effectively utilized to improve the management of aquaculture.

2.8 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 provides feedback to DFO on the coast-wide management of marine finfish aquaculture.

The MF-AMAC brings together a range of interests related to aquaculture to provide coordinated analysis and advice to DFO with regard to aquaculture management in British Columbia. The AMAC provides a venue for discussion 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, environmental non-governmental organizations, 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. The Department also meets with other groups on a more informal, as-requested basis, such as local governmental bodies, recreational fishing advisory boards and commercial fishing industry advisory boards.

Through programs like the Aboriginal Aquatic Resource and Oceans Management (AAROM) and the Pacific Integrated Commercial Fisheries Initiative (PICFI), DFO has invested in building First Nations capacity related to fisheries and 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.

2.9 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.

Other provincial and federal partners in the harmonized licence application process may also have their own protocols for consulting with First Nations.

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. In most new marine finfish applications received by the Department today, First Nations have already been heavily engaged in the planning and development of the application undertaken by the proponent company.

3. MANAGEMENT APPROACH

3.1 Federal-Provincial Roles and Responsibilities

The provincial government continues to play a key role in the management of the aquaculture sector. In December 2010, DFO and the Province of British Columbia signed an *Agreement on Aquaculture Management* which clearly defined federal and provincial responsibilities for the management and regulation of the aquaculture sector in British Columbia.

Under this agreement, 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 British Columbia have developed a harmonized approach to aquaculture-related authorizations and decision-making.

To simplify the application and review process, 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 *Navigation 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 or permits required, such as a provincial Water Licence.

FrontCounter BC coordinates the receipt and distribution of information when an aquaculture application is submitted. DFO works with the Province of British Columbia and Transport Canada through a harmonized application and review process. The parties also work together to coordinate consultation with First Nations where aquaculture-related authorizations are considered by the three agencies (DFO aquaculture licence, Province of British Columbia land tenure, and/or Transport Canada Navigation Protection Act).

3.2 Siting Considerations (Criteria)

Siting of marine finfish aquaculture facilities is an area of joint federal and provincial jurisdiction. The Province of British Columbia 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.

Siting considerations are outlined in the harmonized application form for marine finfish aquaculture, available online at: <http://www2.gov.bc.ca/gov/content/industry/natural-resource-use/land-use/crown-land/crown-land-uses/aquaculture>. Both DFO and the Province consider issues related to siting when reviewing aquaculture licence or tenure applications.

These considerations help British Columbia and DFO identify potential siting issues, which may be addressed through discussion with the applicant and possible revisions to the application.

A review of siting considerations was undertaken by DFO in 2014-2015 with a broad range of stakeholders and First Nations engaged in the review and discussion. Ongoing changes related to siting considerations are reflected in changes to the harmonized application and associated guidebook.

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 substantial amendments to existing marine finfish licences, where there is a potential for a significant increase in the environmental footprint in the 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 Environmental Management Approach

The conservation of marine ecosystems and wild fish stocks is a priority for DFO. The legislation, regulation, policies and a comprehensive suite of related management tools, along with relevant science and research, guide the effective management of aquaculture in British Columbia.

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, while others focus on monitoring and reporting.

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. The objective of DFO's regulation of aquaculture in British Columbia is to ensure that the industry is sustainable and operates 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. Staff work closely with aquaculture resource managers, Fishery Officers and Departmental scientists to identify and manage potential risks to the environment, and to ensure a high level of compliance with DFO regulations and Conditions of Licence.

DFO staff are responsible for:

- drafting 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; incidental catch management, 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 will conduct numerous site visits and environmental audits each year to ensure that industry-generated information and reports are accurate, such as sea lice counts and the results of benthic (seabed) monitoring. Staff also conduct targeted site audits and inspections to assess potential environmental impacts related to benthic performance, incidental catch, sea lice, marine mammal interactions and fish escapes, as well as to support the ongoing development of improved mitigation measures and best practices.

3.4 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 associated regulations. The licence conditions define the responsibilities of operators, and assure processors and consumers that they are buying seafood which has been grown in a licensed, 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. In addition to the generic Conditions of Licence, site-specific conditions may also be included based on the characteristics of the facility, species cultivated, and geographic location.

Licences are issued for the operation of a specific aquaculture site and therefore companies and organizations with multiple sites must obtain a separate licence for each site.

In 2015 user fees were implemented by DFO for marine finfish licences within the Pacific Region. Fees are charged to operators on an annual basis. Information on aquaculture licensing and associated fees is available here: <http://www.pac.dfo-mpo.gc.ca/aquaculture/licence-permis/index-eng.html>.

DFO issued licences which were of one-year duration for marine finfish aquaculture in British Columbia from 2010 to 2016. In spring 2016, the Minister approved the issuance of multi-year licence terms for the shellfish and marine finfish aquaculture sectors. Marine finfish licences may be issued for a term of up to six years, with the exception of sites in the Discovery Islands area (Fish Health Zone 3-2) which continue to be licensed on an annual basis. This shift to longer licence terms provides greater stability for industry and increases investments in innovative, sustainable practices.

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>.

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 British Columbia. 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;
- the requirement to pay annual fees;
- what facilities must do to minimize and address fish escapes, marine mammal interactions and incidental catch of non-cultured fish;
- monitoring requirements;
- fish health and sea lice management requirements;
- the development of, and adherence to, specific management plans;
- record-keeping and reporting to DFO; and
- 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 British Columbia.

3.4.2 Licensed Species

The licence specifies the species of fish that are licensed for cultivation at the site and the maximum biomass of fish to be held within the facility.

3.4.3 Production Plan

The licence holder is required to submit a production plan to the Department by January 15 and monthly thereafter, providing a seven month rolling inventory plan which includes: biomass, number of fish, age class, and harvest activities. Licence holders must also complete the Population Harvest Declaration Form which must accompany harvested fish to the processor.

3.4.4 Transfer of Fish

All movements of fish require introductions and transfers licences. These are issued based on 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 plays the lead role in the management of disease risks.

3.4.5 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 containment array plans that include the number and size of cages and locational information for each corner of the structures.

3.4.6 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. These conditions are in place to minimize the risk of disease transfer and mitigate risks to the health of cultivated and wild fish stocks.

The Conditions of Licence require licence holders to provide, and comply with, a detailed Health Management Plan (HMP) and/or Carcass Management Plan (CMP), as well as specific measures to be taken in the event of a fish health event.¹⁸

Such measures include:

- monitoring fish for signs of infection or disease;
- 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.

The licence also includes protocols for the storage and submission of fish health information, and the requirement to report on losses.

¹⁸ A fish health event is defined as an active disease occurrence on an aquaculture facility that triggers an action, where such action is intended to reduce or mitigate impact and risk associated with that occurrence or event.

3.4.7 Fish Health Record

The licence conditions include additional requirements related to the maintenance and retention fish health records for stocking, fish health activity and the use of therapeutants, pest control products and anaesthetics which are kept at the facility.

Fish Health Event and carcass assessment records are to be assessed by the licence holder's veterinarians, or fish health staff, in order to determine fish health patterns and to facilitate reporting.

3.4.8 Sea Lice Monitoring

Conditions of Licence lay out the sea lice monitoring program that operators in British Columbia 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.

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 from March 1 to June 30. 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 actions to manage the on-farm sea lice levels.

For sites cultivating Pacific salmon, 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 during the March-June period, the licence holder is required to provide a report to DFO.

3.4.9 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).

The results of the licence holder's sea lice assessments are provided to DFO monthly. This data, along with DFO staff-conducted audit data, are posted quarterly on the DFO public reporting website.

Additional monitoring and reporting for fish health treatments is required under the *Aquaculture Activities Regulations*.

3.4.10 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 escape (or suspected escape); report the incident to the Department; and provide a report regarding the incident as well as rectify any problems that may have contributed to the escape.

3.4.11 Incidental Catch

These conditions specify that the licence holder use reasonable care in designing nets and other gear, and use all equipment in a manner that reduces the risk of incidental catch and causes the least amount of harm to those live non-cultured fish caught as incidental catch and subsequently released. The licence holder is required to retain and record all dead wild finfish captured during the transfer 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 12 months (for sites with fish continually on site) and within 15 days of the final date of harvest at the site (for production or grow-out sites).

3.4.12 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 and sea lions) from coming into contact with the facility, and report to DFO any accidental drowning or other mortality of marine mammals, as well as attempt reasonable measures 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 allow licence holders to kill harbour seals and California sea lions which represent an imminent danger to the facility infrastructure or human life and are within or attempting to enter the containment array structure (and cannot be deterred by other means).

All marine mammal fatalities must be reported to DFO within 24 hours. In addition, the licence holder must also submit a report of the details of the situation where marine mammals are killed under the authority of the licence within seven days of the event.

3.4.13 Protection of Fish Habitat

This section specifies the requirements to minimize and mitigate potential effects on fish habitat. These include maintaining on-site records related to in-situ removal of bio-fouling, ensuring that only anchoring equipment is in contact with the seabed, and appropriately disposing of site

debris. Requirements for monitoring the benthic environment around the facility, along with the management of other deleterious substances, are now managed by the *Aquaculture Activity Regulations*. See Section 3.5 of this document for more details.

3.4.14 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 Aquaculture Activities Regulations Requirements

The *Aquaculture Activity Regulations* were enacted in July 2015, and set out specific operational and reporting requirements to legally deposit deleterious substances required for fish husbandry at aquaculture facilities and impose specific environmental monitoring and reporting requirements. To comply with the regulations, aquaculturalists must have measures in place to avoid, minimize, or mitigate any potential serious harm to fish and fish habitat.

3.5.1 Deleterious Substances Authorized

The *Aquaculture Activity Regulations* only permit the use of drugs authorized under the *Food and Drugs Act*, pest control products authorized under the *Pest Control Products Act* and the deposition of biochemical oxygen demanding matter, which is also referred to as organic matter and is generated from excess feed and fish fecal material. The use of drugs may only occur when prescribed by a veterinarian and their use is restricted to the operation and location of the aquaculture facility.

3.5.2 Mitigation

Aquaculture facility operators are required to take measures to minimize the risk of accidental deposits of drugs and pest control products. Before choosing to use drugs and pest control products, operators must consider non-chemical and non-toxic treatment alternatives. They must also document measures taken to minimize detriment from drugs, such as vaccinating fish, mechanical or biological pest controls and good fish husbandry such as appropriate stocking densities, reducing fish stress/injury and proper nutrition. They must also take reasonable measures to minimize impacts on fish and fish habitat outside of the facility, such as using food with good conversion rates and ensuring minimal feed wastage.

3.5.3 Drug and Pest Control Product Reporting

Operators must notify the Minister at least 72 hours before depositing pest control products; including the product name, time, date and geographic coordinates of the deposit.

After the deposit of any drug or pest control product, if fish morbidity or mortality is observed outside the facility within 96 hours after the deposit, the operator must notify the Department.

3.5.4 Seabed (Benthic) Monitoring and Reporting

Facility operators are required to submit information to the Department for review prior to depositing deleterious substances. In the Pacific Region, this information must be provided at the time that an application is submitted for a new site or for an amendment to an existing licence. The AAR clarifies that the information required to assess benthic impact includes predicted contours of organic loading, (e.g. DEPOMOD outputs) survey data that identifies fish and fish habitat at the facility, site bathymetry, and sediment sampling where possible.

3.6 Management Priorities

In addition to the management tools and measures outlined above, a number of management priorities have been identified for the next two to five years for marine finfish aquaculture. These priorities have been identified based on the broader strategic priorities of the Department, scientific research and ongoing environmental monitoring, as well as consultation and engagement with First Nations, industry, stakeholders and other levels of government.

It is anticipated that these priorities will be revised over time as work is completed and based on new science, monitoring and engagement with various 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:

- Integrated Pest Management Approaches
- Engagement and Outreach on Science & Research
- Wild/ Farmed Interactions
- Public Reporting

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

3.6.1 Integrated Pest Management Approaches

Sea lice control in aquaculture is regulated, monitored, and managed to ensure there are measures in place to minimize risk associated with sea lice abundance in British Columbia's coastal ecosystem. DFO will continue to work with industry and other partners to further improve sea lice management at aquaculture facilities. This could include the development of integrated pest management approaches and alternative treatment strategies. DFO will continue to investigate options such as area-based management, potential adjustments of 'trigger abundances' to guide management actions, and alternative control measures (or tools) such as low risk bath techniques to manage sea lice in aquaculture facilities.

3.6.2 Engagement and Outreach on Science and Research

DFO continues to collect data and information related to aquaculture, and to undertake leading edge science and research to improve the management of the sector. In addition to increased investments in aquaculture science, DFO will enhance engagement opportunities for external groups to engage in DFO Science priority setting, completion of research, and reporting out. DFO also intends to work with external groups to increase transparency relating to the linkages between science and research and the decision-making process.

3.6.3 Wild/Farmed Interactions

DFO is committed to managing aquaculture in a manner which protects the health of wild and cultivated stocks in British Columbia. Although the current fish health monitoring programs conducted by British Columbia's aquaculture industry and DFO are extensive and comprehensive, as new science-based information arises, regulatory and industry health programs must adjust and improve accordingly.

In 2014, as a part of continuing science work, DFO initiated the *Aquaculture Science Environmental Risk Assessment Initiative* (<http://www.dfo-mpo.gc.ca/aquaculture/sci-res/aserai-eng.htm>). This initiative builds on the earlier *Pathways of Effects for Finfish and Shellfish Aquaculture* work completed by the Department (http://www.dfo-mpo.gc.ca/CSAS/Csas/Publications/SAR-AS/2009/2009_071_e.pdf), supporting science-based decision-making with regard to aquaculture activities. The initiative will synthesize data and information, incorporate expert opinion, and provide scientific advice through a series of environmental risk assessments of the potential aquaculture stressors on wild fish and the environment across the country.

4. EVALUATION OF PERFORMANCE

4.1 Public Reporting

DFO has committed to an open and transparent approach to the management of aquaculture in British Columbia. 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.

Providing access to relevant and transparent information is an important component of aquaculture management in British Columbia. 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. Public reports on aquaculture in British Columbia are 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 Conditions of Licence for the marine finfish aquaculture sector are updated whenever conditions are updated;
- Licence Holder Information – Information includes licence holder/operating party name, site and general location, species licensed for cultivation, maximum allowable peak biomass and site-specific conditions;
- 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 gathered through DFO audits;
- Incidental Catch – Site by site reports on incidental catch numbers and species;
- Benthic Monitoring (required under the AAR) – Reporting of industry-generated data and annual results of DFO site audits and reports;
- Use of lights at aquaculture facilities;
- Fish Health – A number of reports related to mortality rates, mortality by category, results of fish health testing and disease diagnoses;
- Fish Transfer Information – Summary data reflecting the number of stock transfers within and from without the Pacific Region fish transfer zones;

DFO will continue to improve the transparency, timeliness and utility of the data which are regularly made publically available on its website. Through ongoing engagement with First Nations and key stakeholders, DFO will continue to work to identify information of interest and to improve overall public reporting related to aquaculture management in the Pacific Region.

A summary report of recent data: Regulating and Monitoring British Columbia's Marine Finfish Aquaculture Facilities 2011–2014 is available online: http://www.pac.dfo-mpo.gc.ca/aquaculture/reporting-rapports/mar-rep-rap/2011-2014/sec_1-eng.html.

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, measures, and public reporting/industry performance. The management of aquaculture in British Columbia supports the Government of Canada's broader objective of ensuring the sustainability of the aquaculture industry in 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.