

Regulating and Monitoring British Columbia's Marine Finfish Aquaculture Facilities

2017



**AQUACULTURE
MANAGEMENT**



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Canada

Table of Contents

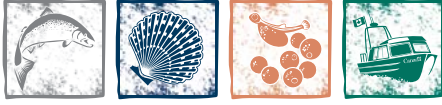
Summary of Marine Finfish Aquaculture in British Columbia.....	1	Monitoring and Audits: Fish Health.....	11
Marine Finfish Species Cultivated in British Columbia	1	Fish Health Management Plans	11
Locations of Marine Finfish Aquaculture Facilities	1	Fish Health in 2017.....	12
How Aquaculture Facilities Are Regulated	3	Sea Lice	13
DFO Responsibilities and Licences.....	3	Fish Mortality	14
Responsibilities of Other Federal Agencies	3	Monitoring and Audits: Environmental	15
Responsibilities of Provincial and Local Governments	4	Benthic (Seabed) Monitoring.....	15
Assessing Compliance	5	DFO's Benthic Audit Program	17
How DFO Assesses the Performance of Aquaculture Facilities	5	Escapes	17
Enforcement Options	6	Atlantic Salmon Watch Program	17
Summary of Charges and Convictions, 2017	7	Incidental Catch	18
Enforcement Activities	7	Interactions with Marine Mammals.....	18
Reporting Requirements and Submissions	8	Use of Lights.....	19
Reporting Requirements	8	Aquaculture Activities Regulations	19
Scheduled Reports	8	Monitoring and Audits: Inventory & Aquaculture Statistics	20
Event-based Reports	9	Inventory Plans and Stock Transfers.....	20
Monitoring and Audits.....	10	Annual Aquaculture Statistical Report	20
		Summary	21

List of Tables and Figures

Figure 1: Map of Marine Finfish Aquaculture Facilities in BC, 2017	2
Figure 2: Marine Finfish Aquaculture Facilities in BC	5
Figure 3: Scheduled Reports Submitted to DFO, 2016 and 2017	8
Figure 4: Event-based Reports Submitted to DFO, 2016 and 2017	9
Figure 5: Fish Health Zone 3.2 (Discovery Island)	10
Figure 6: DFO Fish Health Management Plan Inspections at Salmon Aquaculture Facilities in BC, 2017.....	12
Figure 7: Industry Counts of Motile <i>Lepeophtheirus salmonis</i> Sea Lice between March and June 2017.....	13
Figure 8: Industry-reported and Benthic Monitoring Events 2017	16
 Table 1: Event-based Report – Mortality Events	 14

Purpose

This report, *Regulating and Monitoring British Columbia's Marine Finfish Aquaculture Facilities 2017*, provides an overview of the marine finfish aquaculture industry's performance in meeting the regulatory requirements under the *Pacific Aquaculture Regulations* and the *Aquaculture Activities Regulations*. DFO produces this publication on an annual basis to increase information available on industry's performance in meeting conditions of licence and on DFO's monitoring activities, as part of the Department's commitment to ensuring a sustainable, world-class aquaculture industry in Canada. Information presented on the Department's public reporting web pages are updated as new information is received and may differ from this report.



Summary of Marine Finfish Aquaculture in British Columbia

In British Columbia, the aquaculture industry is primarily regulated and managed by Fisheries and Oceans Canada (DFO). DFO began licensing aquaculture facilities in BC in December 2010. In 2017, there were 116 licensed marine finfish aquaculture facilities (“fish farms”). On average, 61 of these facilities have fish on site at any given time. At the end of 2017, the approved total combined peak production of all marine finfish facilities was 306,223 metric tonnes (MT). A list of all current licence holders for marine finfish aquaculture is available on the DFO website:

www.pac.dfo-mpo.gc.ca/aquaculture/licence-permis/index-eng.html.

Marine Finfish Species Cultivated in British Columbia

Most marine finfish aquaculture licences are issued for salmon, with Atlantic Salmon (*Salmo salar*) and Chinook Salmon (*Oncorhynchus tshawytscha*) being the most commonly farmed fish in BC. Some other species, such as Sablefish (*Anoplopoma fimbria*), are also cultivated on a smaller scale.

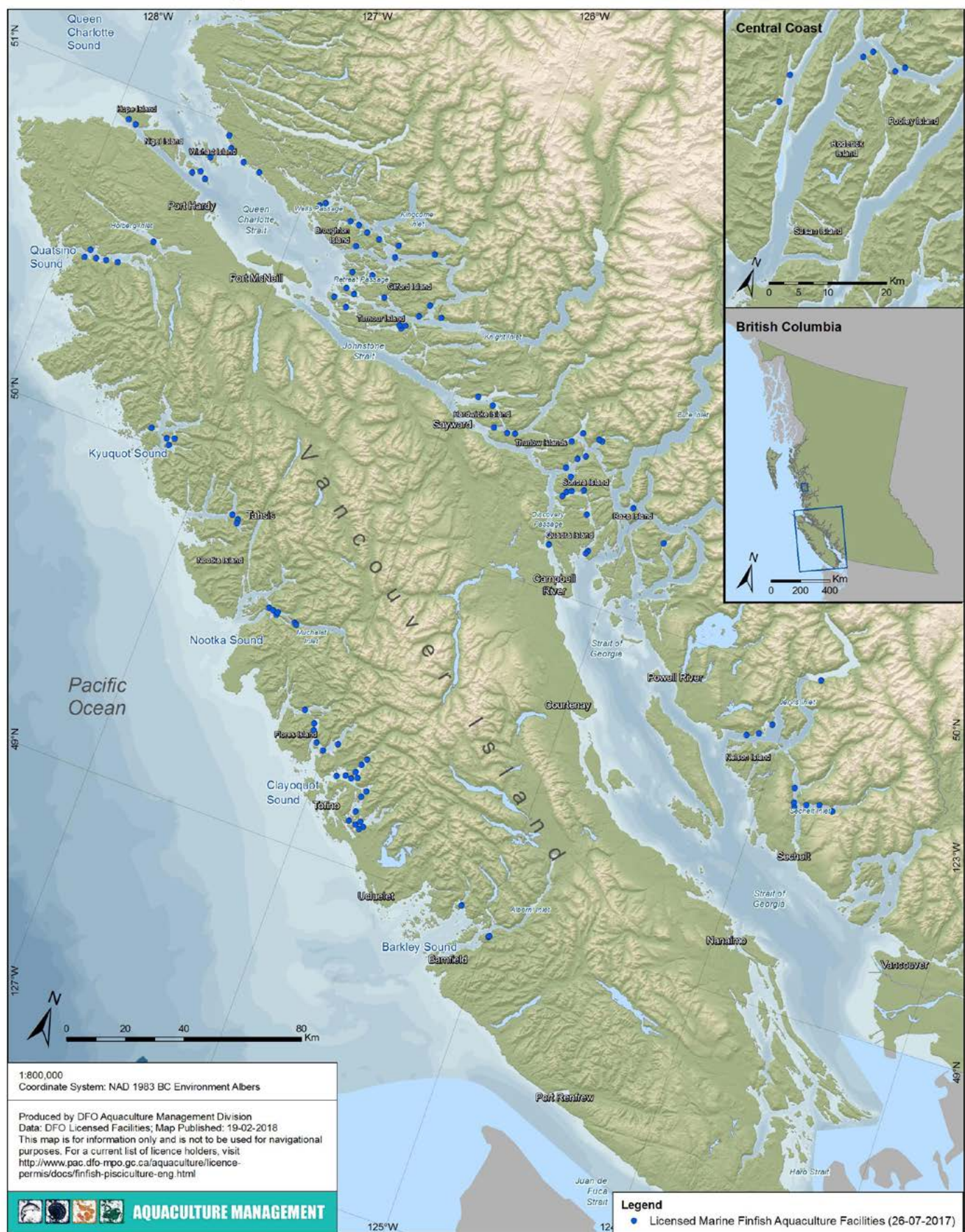
Atlantic Salmon is the preferred species for marine finfish cultivation around the world because these fish feed well on pellets, are efficient at converting food to body mass, grow quickly, and are well adapted to the confines of a net pen.

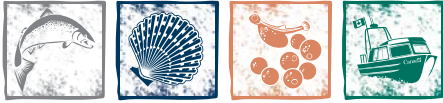
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Locations of Marine Finfish Aquaculture Facilities

Marine finfish aquaculture facilities are mainly located around northern and western Vancouver Island. There are clusters of sites in several areas, such as Clayoquot Sound, the Port Hardy area, the Broughton Archipelago, and the Discovery Islands. All marine finfish aquaculture facilities with a valid licence as of December 31, 2017 are shown in Figure 1.

Figure 1. Map of Marine Finfish Aquaculture Facilities in BC, 2017





How Aquaculture Facilities Are Regulated

DFO Responsibilities and Licences

The most important pieces of legislation governing marine finfish aquaculture activities in BC are the *Fisheries Act*, the *Fishery (General) Regulations*, the *Pacific Aquaculture Regulations* and the *Aquaculture Activities Regulations (AAR)*. The AAR sets out the conditions under which specific deleterious substances can be used by aquaculture operators across the country. DFO is responsible for enforcing the *Fisheries Act* and regulations.

Through the BC Aquaculture Regulatory Program (BCARP), DFO

- **develops and implements** policies, regulations, and licence conditions related to BC aquaculture
- **assesses** applications for new licences and amendments to existing licences
- **monitors** aquaculture facilities to ensure that they are operating according to the regulations and that they conform to the required environmental standards
- **engages** with First Nations and stakeholders
- **coordinates** with partner departments and agencies at various levels of government regarding how aquaculture facilities are to be governed

Licences for marine finfish facilities require that all of the following be managed and monitored: which species are cultured, production levels, containment of fish, the introduction and transfer of fish, fish health, sea lice, incidental catch of wild fish (bycatch), escapes, interactions with marine mammals and the impacts to fish habitat. Additional site-specific licence conditions may be imposed where required. DFO has a monitoring, audit and surveillance program to ensure that each facility complies with its licence conditions.

Responsibilities of Other Federal Agencies

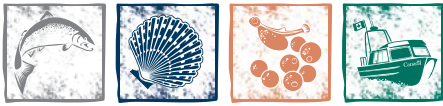
Other federal agencies also have legal responsibilities relating to aquaculture activities. For example, the Canadian Food Inspection Agency has responsibilities under the *Feeds Act*, and *Health of Animals Act*; Health Canada under the *Food and Drug Act* and the *Pest Control Products Act*; Environment Canada under the *Canadian Environmental Protection Act* and Transport Canada under the *Navigation Protection Act* and the *Canada Shipping Act*.

Responsibilities of Provincial and Local Governments

The Province of British Columbia is responsible for issuing Crown land tenures, which authorize the use of Crown land for aquaculture activities, including the use of the seabed under and around finfish facilities. Separate provincial legislation regulates how farmed fish are processed, how the processing wastewater is disposed of and how dead fish are disposed of on land. The provincial government is also responsible for the management and regulation of business

and labour aspects of aquaculture in BC. Local governments are not directly involved with marine finfish aquaculture, but are responsible for land zoning and water usage for other aquaculture sectors in BC.

More information on aquaculture in BC is available on our website: www.pac.dfo-mpo.gc.ca/aquaculture/index-eng.html.

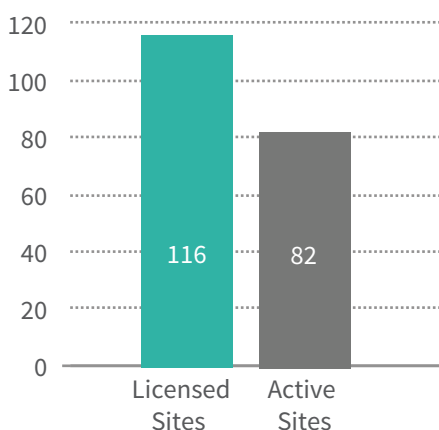


Assessing Compliance

How DFO Assesses the Performance of Aquaculture Facilities

DFO conducts audits, monitoring and surveillance activities to establish a clear picture of the BC aquaculture industry’s operational and environmental performance. Information gained through these activities allows the Department to assess its current regulatory approach and inform future management decisions. DFO analyzes the results of site inspections and technical audits and reports the results online to give the public a view of industry compliance. In 2017, there were 116 licensed marine finfish aquaculture facilities, 82 of which were considered “active,” which means stocked with fish for at least one day in the calendar year. On average, 61 were active concurrently.

Figure 2. Marine Finfish Aquaculture Facilities in BC



In 2017, Fishery Officers and other DFO staff including veterinarians, biologists and fish health technicians conducted site visits year round.

Monitoring and surveillance activities can include:

Assessing compliance with licence conditions to ensure

- complete and accurate records and paperwork
- no culturing of unlicensed species
- production is at or below the licensed maximum
- appropriate markings and signage
- appropriate storage and tagging of equipment, feed, and chemicals
- compliance with Fish Health Management Plans
- appropriate management of site debris
- complete and accurate containment array plans, marine mammal management plans, and fish escape prevention plans

Inspecting nets, cage arrays, and other physical structures

Auditing fish health and sea lice records

Monitoring the effects on the surrounding environment using benthic (seabed) surveys

Conducting watershed surveys to search for escaped farmed salmon

Reviewing protocols for fish health management

Observing harvests and transfer to assess mitigation and reporting of incidental catch, visiting processing plants to confirm that records have been submitted to DFO accurately

Responding to reported concerns related to specific aquaculture facilities

During site inspections, DFO assesses compliance based on the marine finfish licence conditions: www.pac.dfo-mpo.gc.ca/aquaculture/licence-permis/index-eng.html. Deviations from these conditions are noted as “violations” which licence holders are required to address.

Enforcement Options

Fishery Officers are responsible for enforcing the *Fisheries Act*, the *Fishery (General) Regulations*, the *Pacific Aquaculture Regulations* and the *Aquaculture Activities Regulations* as they pertain to the aquaculture industry in BC and are responsible for investigating potential violations. Reports, complaints and discoveries of potential violations are recorded by Fishery Officers as “occurrences” and must be validated before an enforcement action is taken. The response is determined based on the severity of the violation. There is a range of enforcement options available:

Education

Used to promote compliance and corrective measures.

Warnings

Issued to the violator and form part of the permanent compliance record for the individual or company. Follow-up inspections and corrective measures may be required.

Charges

An individual or company may face formal charges laid in court for one or more violations. The Fisheries Act allows a maximum penalty of a \$100,000 fine and/or one year in jail for summary convictions and a \$500,000 fine and/or two years in jail for an indictable conviction. Extra costs may also be imposed, and seized items may be forfeited.

Alternative Measures

These are measures outside the judicial process. In some cases, the accused will be offered the opportunity to engage in alternative measures or a restorative justice process instead of proceeding to court. Restorative justice is designed to address offending behaviour and conflict in a formally recognized dispute resolution process. Restorative justice may take place before or after charges are laid.

Summary of Charges and Convictions, 2017

There were no charges or convictions related to marine finfish operations in 2017.

Enforcement Activities

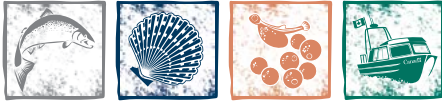
In 2017, Aquaculture Fishery Officers conducted 21 site visits and encountered no violations. However, Aquaculture Fishery Officers investigated 2 other potential violations reported to the Department related to marine finfish aquaculture facilities in 2017. One occurrence is under investigation (*Fishery General Regulations, section 22(7)*) and the other (*Fisheries Act, section 36(3)*) has been sent to Crown Counsel for prosecution.



2017 Violations

Of the 21 sites inspected,

NONE WERE IN VIOLATION



Reporting Requirements and Submissions

Reporting Requirements

Under the *Pacific Aquaculture Regulations* (PAR), licence holders are required to submit to DFO reports that fall into two broad categories: scheduled reports and event-based reports. All reports are reviewed by DFO to validate content to ensure that they contain all elements required by the licence conditions, and to determine if they were submitted on time. When a report contains only minor administrative omissions or errors and the licence holder corrects these in a timely manner, the reports may be considered complete and on time. Beginning in 2016, some reporting components required under PAR were removed to avoid duplication with reporting requirements under the *Aquaculture Activities Regulations* (e.g. use of pesticides and therapeutants). Data for these reports are collected and reported nationally.

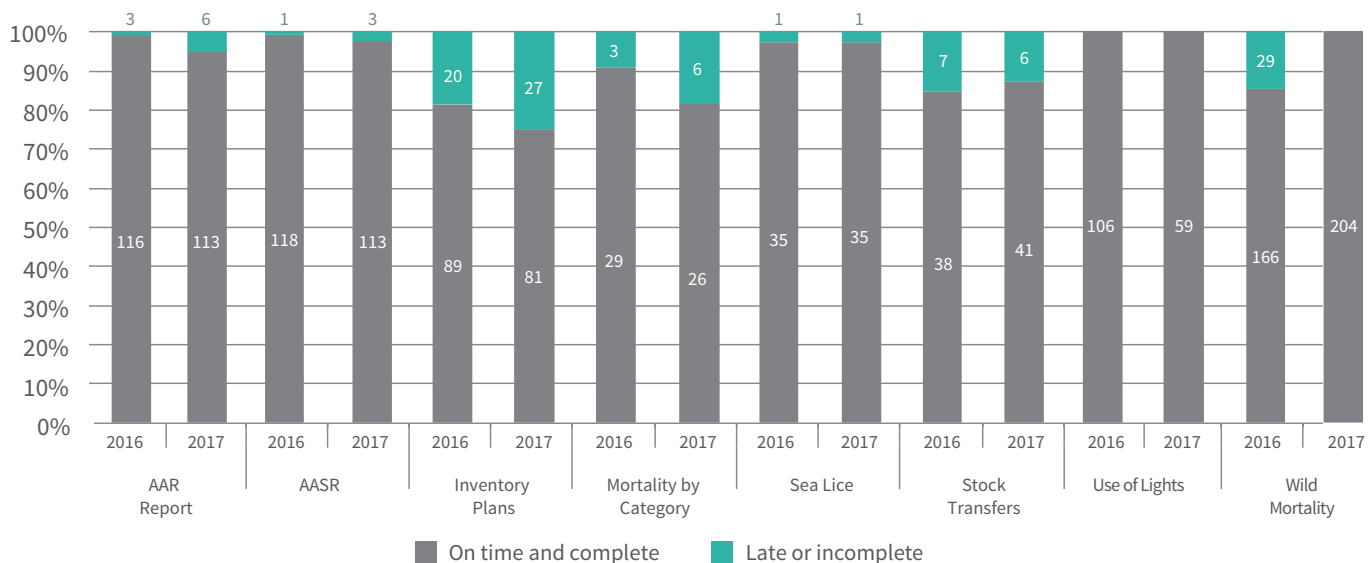
Scheduled Reports

Reports are submitted on a pre-determined schedule (monthly, quarterly or annually):

- *Aquaculture Activities Regulations* (AAR) Reports
- Annual Aquaculture Statistical Report (AASR)
- inventory plans
- mortality by category
- stock transfers
- sea lice
- use of lights

Figure 3 summarizes the scheduled reports submitted to DFO in 2017, showing the percentage of reports which were complete and whether they were submitted on time.

Figure 3. Scheduled Reports Submitted to DFO, 2016 and 2017



Event-based Reports

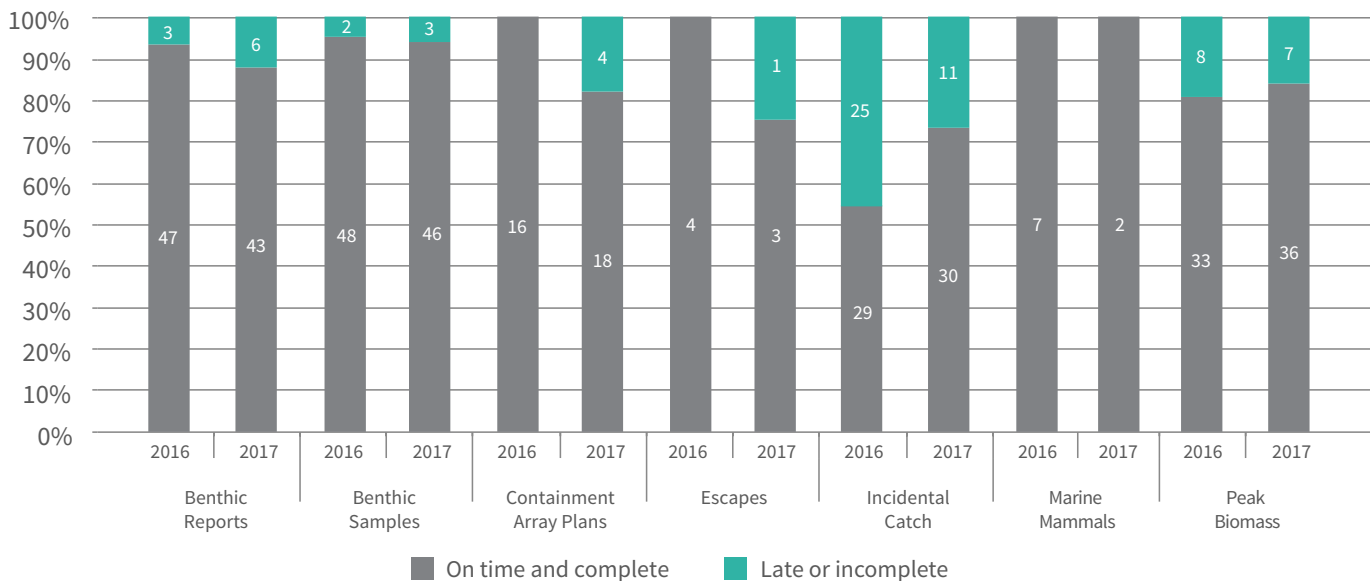
Event-based reports are submitted following specific incidents or events identified in the licence conditions. These reports include:

- benthic (BOD) monitoring¹
- escapes
- marine mammal drownings
- marine mammal authorized predator control activities
- incidental catch
- urgent mortality event and follow up reports
- alternate cage array use

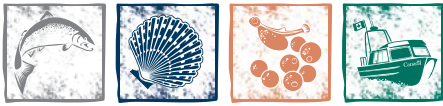
Additional data on the event-based reports is contained in subsequent sections of this report.

For specific reporting timelines and detailed requirements for each report, please refer to the Marine Finfish Conditions of Licence: www.pac.dfo-mpo.gc.ca/aquaculture/licence-permis/index-eng.html.

Figure 4. Event Based Reports Submitted to DFO, 2016 and 2017



¹ Although no longer required under the *Pacific Aquaculture Regulations*, benthic (BOD) monitoring is now required under the authority of the *Aquaculture Activities Regulations*, and therefore DFO staff in BC continue to review benthic monitoring results to assess the environmental performance of the industry.



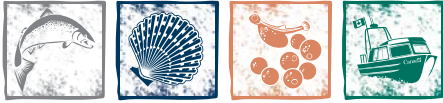
Monitoring and Audits

DFO is committed to a regulatory approach that ensures the aquaculture industry operates sustainably and with minimal impacts to wild fish stocks. Prior to 2015, all marine finfish licences were licensed on an annual basis. Since 2015, marine finfish facilities outside of the Discovery Islands are eligible for a six-year licence term. Facilities in the Discovery Islands (Fish Health Zone 3.2) are not eligible for a multi-year licence and licence holders must apply to have these licences renewed each year.

The Minister of Fisheries, Oceans and the Canadian Coast Guard may revise the licence conditions at any time during the licence term, in response to legislative changes or conservation concerns.

Figure 5. Fish Health Zone 3.2 (Discovery Islands)





Monitoring and Audits: Fish Health

Fish Health Management Plans

Aquaculture facility operators are required to regularly report to DFO on the health of their stocks and any treatments they have used. These reports are reviewed by DFO veterinarians to assess whether appropriate measures are being taken and to detect any potentially serious diseases as early as possible.

DFO fish health professionals also inspect sites and ensure that aquaculture licence holders growing salmonids are complying with their Health Management Plans, or in the case of non-salmonid facilities, their Carcass Management Plans.

The methods and protocols for this monitoring can be found at:

www.pac.dfo-mpo.gc.ca/aquaculture/reporting-rapports/index-eng.html.

At active salmon facilities, DFO fish health professionals conduct fish health and sea lice audits and inspections throughout the year to check that the cultivated fish are healthy and that the facility Health Management Plan is being followed.

During on-site fish health inspections, DFO fish health staff audit the following:

- biosecurity measures
- feed, nutrition, and medication records and usage
- water quality monitoring
- carcass retrieval protocols
- fish health records and husbandry records
- sea lice – handling, counting, and assessment procedures
- fish welfare, handling, and euthanasia
- disease outbreak management plan

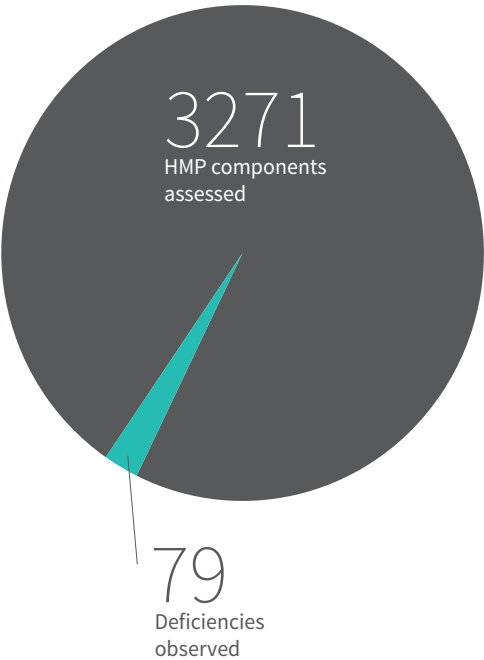
DFO staff collects recently dead (“silver”) carcasses during inspections to verify the facility veterinarians’ routine monitoring and reporting of diseases common to BC’s wild and farmed fish. During fish health audits, DFO compares inspection results to reports submitted by the aquaculture companies each calendar quarter.

Fish Health in 2017

Figure 6 summarizes the results of the Fish Health Management Plan inspections by DFO in 2017. A total of 123 Health Management Plan inspections were completed and no Carcass Management Plan inspections were conducted. DFO observed no deficiencies during 55.2% of HMP

inspections. During the inspections, a total of 3271 components were assessed, and 79 deficiencies were observed. The most frequently observed deficiencies included: carcass retrieval protocol or record keeping, disease contingency or mass mortality information or records, and lice protocol or lice records as per the conditions of licence.

Figure 6: DFO Fish Health Management Plan Inspections at Salmon Aquaculture Facilities in BC, 2017



Deficiencies Observed

- Carcass retrieval protocol or record keeping **18**
- Current licence was not posted at facility **3**
- Disease contingency or Mass mortality information or records **11**
- Fish handling, euthanasia protocol or records **1**
- Footbaths or sanitizers **1**
- Husbandry or record keeping as per COL Appendix VIII-A or VIII-B **3**
- Lice protocol or lice records as per COL Appendix VII or VII-A **26**
- Mooring signage **3**
- Nutritional or medicated feed protocol concerns **1**
- Training documentation is not up-to-date **1**
- Transfer records are not complete or up-to-date **6**
- Visitor protocol communication **1**
- Water quality monitoring, equipment or record keeping **1**
- Wild fish mortality records need clarification **3**

Sea Lice

Licence holders must count sea lice at active Atlantic Salmon facilities throughout the year. Sampling for sea lice occurs monthly from July to February, and every two weeks from March 1 to June 30 when wild salmon smolts out-migrate. The licence holder must report to DFO within seven days if the average number of motile *Lepeophtheirus salmonis* (a species of sea lice) exceeds three sea lice per fish during the wild salmon outmigration period.

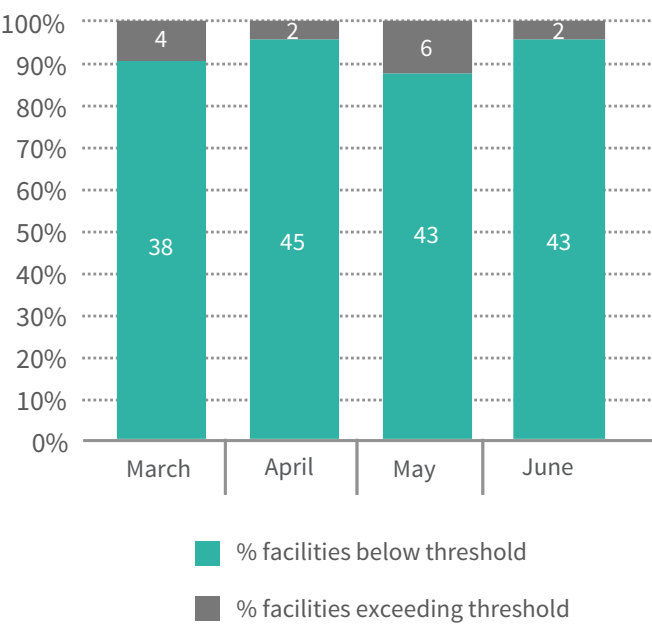
Cultured Pacific Salmon must be monitored for sea lice on a quarterly basis; observations must be recorded and made available to a Fishery Officer or Fishery Guardian for inspection. As with Atlantic Salmon, if the number of motile sea lice exceeds an average of three per cultured Pacific Salmon, the licence holder must notify the Department within seven days of discovery.

Sea lice monitoring is not required at Sablefish facilities. DFO performs sea lice counts at selected active Atlantic Salmon farms to assess industry sea lice counting procedures. DFO also audits records to verify the accuracy of industry reporting.

At certain times, counting sea lice may be risky or harmful to farmed fish because some natural phenomena, including algal blooms and low dissolved oxygen (hypoxia), can stress or kill finfish. During these events, handling of farmed fish to perform sea lice counts is limited. All possible effort is made by DFO biologists to reschedule these audits.

Although various species and life stages of sea lice are counted, management actions are only required when the motile *Lepeophtheirus salmonis* sea lice threshold has been exceeded at a farm during the wild salmon outmigration period. Figure 7 below illustrates the percentage of sites where the average number of motile *Lepeophtheirus salmonis* sea lice per fish exceeded the threshold as reported by industry.

Figure 7: Industry Counts of Motile *Lepeophtheirus salmonis* Sea Lice between March and June 2017



In 2017, during the wild salmon outmigration period from March 1 to June 30, industry conducted 523 sea lice counts at active farms and reported that 94.46% of counts were below the three motile sea lice per fish threshold.

DFO conducted 73 audits of 44 unique facilities in 2017. Approximately 59% of the 44 aquaculture facilities were audited during the outmigration period in select fish health zones. DFO’s audit results can differ from industry’s results since fish are not sampled at the same time and sea lice levels can fluctuate over time. Audit count agreement is evaluated statistically and concordance of DFO and industry results is approximately 89%.

More detailed monitoring results can be found on DFO’s website: <http://www.pac.dfo-mpo.gc.ca/aquaculture/reporting-rapports/lice-ab-pou/index-eng.html>.

Fish Mortality

Licence holders are required to report on the numbers and causes of fish deaths at aquaculture facilities. Low levels of mortality normally occur in any large population of animals. A *Mortality by Category* report describes the number of dead fish within specified mortality categories at the facility and must be submitted quarterly to DFO. This report also lists any therapeutants, pest control products or anaesthetics used to treat the cultured fish during that quarter. The licence holder must send an Urgent Notification to DFO within 24 hours of discovering a “mortality event” as defined by

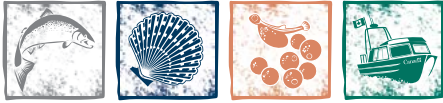
the licence conditions². This notification provides as much detail as possible to DFO about the nature and extent of the event. After the Urgent Notification, a detailed report with information on the total weight of dead fish (or percentage of the population), number of dead fish, and cause of the mortality event must be submitted within ten days. For events that persist, updated reports must be submitted every ten days until mortality levels return to normal.

Table 1 summarizes the number of reports and the cause of the mortality event reported by industry. In 2017, the most common causes of mortality events were low dissolved oxygen and harmful algae blooms. During this period, 26 reported mortality events were attributed to those causes. During the same period, causes such as handling, health management treatment, predation and other environmental causes accounted for the other 14 mortality events.

Table 1. Event-based Report – Mortality Events, 2017

Number of Events	Type and Number of Reported Mortality Events
40	Harmful algae (7) Low dissolved oxygen (20) Environmental (3) Handling (4) Predation (2) Health Management Treatment (4)

² “Mortality event” means:
 (a) fish mortalities equivalent to 4000 kg or more, or losses reaching 2% of the current facility inventory, within a 24 hour period; or
 (b) fish mortalities equivalent to 10,000 kg or more, or losses reaching 5%, within a five day period.



Monitoring and Audits: Environmental

Benthic (Seabed) Monitoring

Aquaculture licence holders are required to conduct benthic monitoring at all of their sites that produce more than 2.5 tonnes of fish annually. This ensures that the impacts of organic waste (mainly fish feces) from the sites are restricted in extent and intensity. As part of its monitoring program, DFO conducts benthic audits as well as information-gathering surveys. During the audits, DFO follows the same procedures as industry, samples within the same time frame (within 30 days before or after the peak biomass date), and samples similar locations. DFO benthic audit results are therefore directly comparable to industry results.

At sites with a hard ocean substrate (seabed), video data is gathered using remotely operated vehicles (ROVs) with underwater cameras. At least two transects (lines along the seabed) are monitored at each site. Video is taken from the cage edge to at least 140 metres away on at least two sides of the fish farm site.

The video collected is assessed by industry representatives and DFO staff, who observe and record various types of information. The zone of compliance for hard bottom sites is between 100 and 124 metres from the cage array, although video is always also taken closer and farther away. The zone of compliance is divided into six segments, each four metres long, and each of the segments is assessed. If required, the post-compliance zone (124–140 metres away from the cage array) is also assessed.

To check whether hard-bottom sites comply with the regulated standards, DFO staff check the video footage to assess the area of the seabed covered by two indicators of organic waste: *Beggiatoa*-like species, which are bacteria that form visible mats in areas of organic enrichment, and opportunistic polychaete complexes (OPCs), which are worms found in the seabed and in areas of organic enrichment. Although these species actually help break down accumulated waste, their abundance indicates impact due to organic enrichment.

When allowable thresholds of *Beggiatoa*-like species or OPCs are exceeded, the site must be fallowed (left empty) until further monitoring shows that it has recovered sufficiently.

Licence holders submit benthic monitoring data to DFO prior to stocking a site, at peak production, or every 24 months for sites with fish continually on site.

Figure 8. Industry-Reported Benthic Monitoring Events, 2017

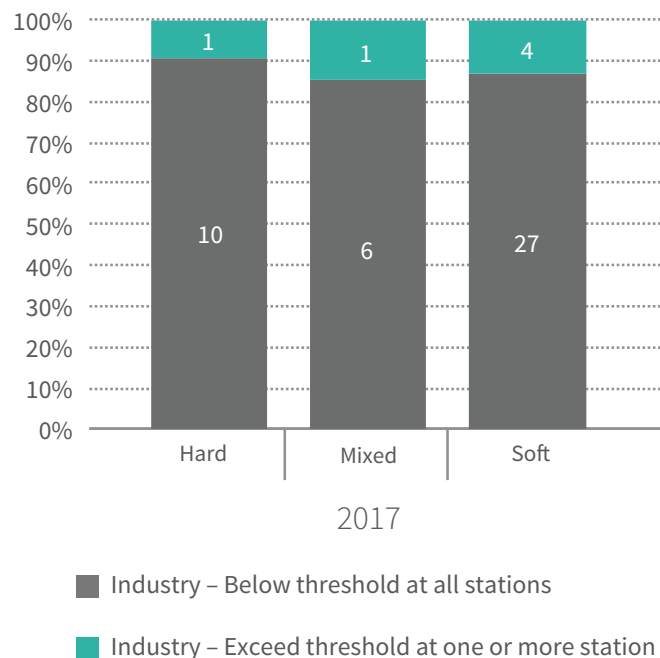


Figure 8 summarizes the seabed sampling reports submitted by industry in 2017.

More information and public reports can be found at: www.dfo-mpo.gc.ca/aquaculture/protect-protege/waste-dechets-eng.html.

At sites with a soft ocean substrate (seabed), at least two transects (lines across the seabed) are monitored by taking sediment samples at 30 and 125 metres from the cage edge and analyzing their physical and chemical properties. Sediment sampling must occur at two sides of the cages and where the most impact is expected. Additional sampling may be required as outlined in the *Aquaculture Activities Regulations* or as prescribed by DFO.

Compliance at soft seabed sites is determined by measuring the level of free sulphides. Free sulphides are related to the amount of oxygen in the sediment, which in turn contributes to the biodiversity (variety of living organisms) that the sediment can support. The standards for free sulphides are designed to manage the intensity of impact and ensure that the seabed can recover in a reasonable amount of time when fish are removed from marine net pens. When thresholds of free sulphides at the 30 metre and 125 metre stations are exceeded, the site must be fallowed (no fish) until further monitoring shows that it has recovered sufficiently.

Industry-submitted data from January to September 2017 showed that an average of 82% of 39 sampled facilities were below the allowable environmental thresholds.

DFO's Benthic Audit Program

DFO assesses industry's benthic monitoring results by reviewing every incoming report and by conducting site audits. DFO benthic audits fulfill four purposes:

1. To compare industry-generated data with DFO-generated data to ensure that industry is following the correct procedures and that the two data sets are similar.
2. To determine whether the compliance sampling stations or transects used by industry are appropriate.
3. To investigate sites with poor environmental performance.
4. To learn more about benthic impacts during different parts of the production cycle and site recovery cycle.

For facilities with soft seabeds, DFO conducts field assessments in the same location as industry to compare the results. For facilities with hard seabeds, DFO reviews the video data captured by industry and conducts a field assessment at the same location as industry.

Benthic sampling reports submitted by industry in 2017 matched DFO's field and video audits. Eleven site audits were conducted by DFO, and DFO's audits indicated that 100% of results were consistent with industry-submitted reports.

In cases where DFO and industry monitoring results are inconsistent, DFO directs industry to use the monitoring results that show greater impact and to respond to the results as required by their licence.

Escapes

The aquaculture industry must take all reasonable measures to prevent the escape of cultivated fish, but in the unlikely event of an escape, the licence holder must take immediate action to control and confine it. Escapes are reported to DFO upon discovery, and a follow-up report is submitted within seven days after the escape or suspected escape.

During site inspections, DFO staff visually examine site integrity as well as records of cage maintenance and net integrity to ensure that nets are of the appropriate strength and age, in good repair, are inspected regularly and are deployed correctly.



2017 Escapes

4 reports received | **9** fish escaped

Detailed information on the escape of cultured fish, including the description of each incident, can be found at www.dfo-mpo.gc.ca/aquaculture/protect-protege/escape-prevention-evasions-eng.html.

Atlantic Salmon Watch Program

The Atlantic Salmon Watch Program, established by DFO in 1991 to monitor for escaped Atlantic Salmon in BC rivers, has been monitoring for escaped Atlantic Salmon in BC rivers for more than two decades. The purpose of the program is to study the abundance, distribution and biology of Atlantic Salmon in British Columbia and its adjacent waters. The ASWP monitors reports from commercial and sport catches and observations of Atlantic Salmon throughout the province. To date, there is no evidence of established Atlantic salmon populations in the wild in BC.

For more information, please refer to the program website: www.pac.dfo-mpo.gc.ca/science/aquaculture/aswp/index-eng.html.

Incidental Catch

Incidental catch is any wild fish caught or found dead within the facility during harvest, while fish are being moved within or between facilities or during net removal. Wild fish sometimes swim into containment nets at marine finfish facilities and grow along with cultured fish until they are too large to swim out of the nets. Aquaculture licence holders are not allowed to cultivate or sell any species of fish not listed on their licence. All incidental catch during transfer and harvest must be recorded and reported to DFO. Aquaculture licence holders must take reasonable care to reduce the risk of incidental catch and immediately return live incidentally-caught fish to waters outside the aquaculture facility in the least harmful manner possible.

Incidental catch reports are required to be submitted within 15 calendar days after harvest; a follow up report is required if more incidental catch was discovered after nets were removed. For facilities that continuously have fish present, records must be submitted annually for the previous 12 months. In 2017, aquaculture facilities achieved 76% compliance for incidental catch reporting.

**2017
Incidental
Catch**

54,160 fish



DFO monitors fish harvests and transfers to ensure the proper handling, record-keeping, and identification of incidental catch. For detailed information on incidental catch, including the number of fish and species caught, please visit: www.dfo-mpo.gc.ca/aquaculture/protect-protege/removal-fish-retraits-poissons-eng.html.

Interactions with Marine Mammals

Licence conditions require every aquaculture licence holder to take all reasonable measures to prevent marine mammals from coming into conflict with the facility infrastructure and farmed fish.

License holders must:

- Have a Marine Mammal Interaction Management Plan that DFO reviews for compliance with the licence.
- Report drownings and authorized predator control activities to DFO.

DFO audits reports of marine mammal incidents to ensure that licence holders have taken reasonable preventative actions. If DFO has questions about the effectiveness of preventative actions, staff members follow up with the licence holder to review the details of the event.

DFO staff also review records on-site related to preventing escapes and managing marine mammal conflicts. For example, dive records indicate net maintenance and repairs (often required as a result of damage by marine mammals) as well as incidents in which marine mammals became entangled and were released.

18



2017 Marine Mammals

2 drowning events
(harbour seals)

0 predator
control events

Use of Lights

Underwater lighting at marine finfish aquaculture sites is used to delay the start of sexual maturation. This improves feeding behaviour, growth rates, and the quality of fish flesh. Lights are used within net cages at night from autumn to spring, when there are fewer hours of daylight.

The licence holder must record and report on the use of lights to promote fish growth. This report is submitted to DFO annually by February 15 and summarizes data for the previous calendar year. DFO audits each report for completeness. In 2017, of 59 expected reports on Use of Lights, 100% were received and compliant.

Further information on the use of lights at aquaculture facilities can be found here: <http://www.dfo-mpo.gc.ca/aquaculture/protect-protege/alteration-habitat-eng.html>.

Aquaculture Activities Regulations

The *Aquaculture Activities Regulations (AAR)* clarify conditions under which aquaculture licence holders may install, operate, maintain or remove an aquaculture facility, or undertake measures to treat their fish for disease and parasites, as well as deposit organic matter, under sections 35 and 36 of the *Fisheries Act*. The *AAR* allows aquaculture licence holders to conduct these activities with restrictions to avoid, minimize and mitigate any potential detriments to fish and fish habitat. The *AAR* also imposes specific environmental monitoring and sampling requirements on the industry.

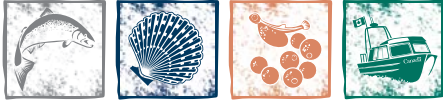
Under the *AAR*, licence holders must notify DFO of:

- Their intent to deposit pest control products;
- Any morbidity events of wild fish they observe outside the facility;
- Any exceedances of biological oxygen demanding thresholds; and,
- When they submit an application to a provincial or territorial authority for a new or expanded site.

Aquaculture licence holders are required to submit annual reports on their activities to the appropriate Regional Aquaculture Management Office no later than April 1 of the following year. The annual *AAR* report requires the submission of information on:

- deposits of drugs and pesticides
- measures to minimize detriment from deposit of feces, feed, pesticides and/or drugs
- monitoring of biochemical oxygen demanding (BOD) matter (see benthic monitoring)

More information about the *AAR* and the reporting requirements under the regulation can be found at: www.dfo-mpo.gc.ca/aquaculture/management-gestion/aar-raa-eng.htm.



Monitoring and Audits: Inventory & Aquaculture Statistics

Inventory Plans and Stock Transfers

Licence holders submit an annual inventory plan each January in addition to monthly inventory plans throughout the year. An inventory plan outlines a seven-month rolling inventory plan for all licensed species, including biomass, number of fish, age class, and harvest activities. The first month of the plan must reflect the calculated inventory at the facility for the previous month, and the remaining six months must be projected inventory. A plan must be submitted even when no production is occurring. Any transfers of stock from one facility to another must be reported if the transfers occurred in the previous month.

DFO audits the inventory plans by ensuring that:

- Transfers and harvests agree with the inventory plan.
- Drastic drops in biomass are accounted for in harvest, transfer or escape reports.
- Sites do not exceed their licensed production limit.

Detailed fish transfer information can be found at:
www.dfo-mpo.gc.ca/aquaculture/management-gestion/rep-rap-eng.htm#bc.

Annual Aquaculture Statistical Report

DFO collects information regarding fish production, processing, and sales for statistical purposes. This report must be submitted to DFO no later than January 25 for the previous calendar year. In 2017, all marine finfish Annual Aquaculture Statistical Reports were submitted to DFO, with an average of 98% of reports submitted on time.

20

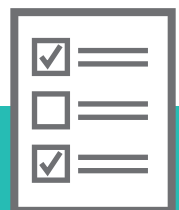
2017 Inventory Plans and Stock Transfers

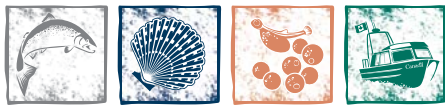
75%
OF 108

expected **Inventory
Plan** reports were
compliant

87%
OF 47

expected **Stock
Transfer Plans**
were compliant





Summary

DFO Aquaculture Management is committed to the conservation of marine ecosystems and wild fish stocks. Dedicated DFO staff members inspect aquaculture facilities and audit industry-submitted reports to ensure that the aquaculture industry continues to show high levels of compliance with

conditions of licence. DFO continues to employ adaptive management approaches, including updated monitoring and reporting requirements to ensure a responsible, sustainable and economically prosperous aquaculture sector.