Annual Compliance Report - 2019

on the

Code of Containment

for the Culture of Salmonids in Newfoundland and Labrador

Newfoundland Labrador

Department of Fisheries, Forestry and Agriculture
Aquaculture Development Branch

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1.0 Executive Summary

Production in the Newfoundland and Labrador (NL) salmonid aquaculture industry has decreased from 15,107 MT in 2018 to 14,167 MT in 2019. The effects of Infectious Salmonid Anemia virus (ISAv) continued into 2019 and, when combined with unexpected mortality from high sea temperatures, contributed to the decline in overall production.

The Department of Fisheries, Forestry and Agriculture (FFA) is the lead regulator for the NL aquaculture industry. The department manages the sector through robust policies and regulations designed to ensure the sustainability of the industry and environment. This approach helps to ensure that best aquaculture practices are being adhered to. The Code of Containment (Code) is an integral part of the approach to successfully manage the salmonid sector and is a condition on all salmonid licenses.

Compliance with the Code in Newfoundland and Labrador is monitored annually by FFA and continues to be generally high. However, in an effort to continually seek improvements and efficiencies, the Code underwent major revisions in late 2012 and 2014. These revisions were endorsed through the Aquaculture Liaison Committee; which is comprised of industry, government, and public stakeholders. Additional changes were made in 2019 to strengthen the escape prevention and response sections, and to bring the Code in line with FFA's Aquaculture Policy and Procedures Manual. The following changes and/or additions were made:

- Net inspections are to occur every 30 days, changed from every 90 days. Records must be maintained for below surface inspections;
- New salmonid licensees' sea cage system components and installations must meet ISO or certified third-party engineering standards as of January 1, 2020;
- Existing salmonid sea cage licensees' sea cage system components and installations must meet IOS or certified third-party engineering standards as of January 1, 2024;
- Inclusion of the mesh size table from "Determination of the Appropriate Cage Mesh Size for Retention of Salmonid Juveniles" by the Memorial University of Newfoundland's Marine Institute in March 2000;
- The activation/trigger for reporting of escapes have been changed from 100 fish to any escape or suspected escape of a single fish. The new wording in the Code states: "In the event of an escape incident where it is reasonable to believe that there may have been an estimated loss of fish from any one cage, the incident is deemed to constitute a significant escapement and the license holder is required to commence discussions with DFO within 24 hours of the incident to determine if recapture efforts should be initiated";
- The following sections were added to Appendix 7 to reflect FFA's new reporting requirements:

    1. For all suspected escapes events, the licensee is required to report:

a) The farm(s) of the escape;

b) The species escaped; and

c) Any other information deemed by the department to be reportable.

2. For all confirmed escape events, the licensee is required to report:

a) The farm(s) of the escape;

b) The species escaped;

c) The cause of the escape;

d) The estimated number of Fish escaped;

e) The recapture plan for escaped animals; and

f) Any other information deemed by the department to be reportable; and

- The requirements for recapture gear has changed from an "it is suggested" to a "shall" making the requirement mandatory. This requirement is a condition of license.

The Code inspection/reporting program was conducted by FFA throughout 2019. Inspections occurred on 27 active aquaculture farms between January 2019 and December 2019. Reporting and inspection results are summarized below:

Nets and Net Testing:

- 313 nets were recorded in company's net inventories in 2018. FFA staff recorded 209 nets on farms in the spring and 58 nets on farms in the fall. There was full compliance with net inventories and audits.

Cage Types:

- One new cage type was used in 2019 – Aqualine's Midgard system

Mesh Sizes:

- Appropriate mesh sizes were in use as per industry standard practice and in accordance with mesh size reports commissioned in 2000-2001.

Moorings:

- A "Mooring Maintenance/Replacement Plan" is required to be resubmitted annually for all active farms. All companies have submitted for 2019.

Inventory Monitoring and Reconciliation:

- Industry was fully compliant with this section of the Code. Industry wide, the inventory reconciliation period covered a starting number of 8,422,965 salmonids and ended with 6,164,214 salmonids.

Ice Protection:

- There were no new overwintering farms utilized in 2019.

System Inspections:

- FFA performed 27 site inspections in spring and 9 in the fall. Out of these 27 site inspections, 7 were follow-up inspections to ensure issues noted were addressed in a timely manner. 43 issues were recorded.

Predator Control Plans:

- Predator control has been addressed on a farm-by-farm basis through the cage culture application. The application requires applicants to describe what predators they expect and how they will deal with them.

Handling Practices:

- All companies were in compliance with all handling practices as outlined in the Code.

Measures for the Recapture of Escaped Fish:

- Fisheries and Oceans Canada (DFO) is responsible for this section of the Code. As no escapes were reported in 2019, recapture efforts were not required.

2.0 Introduction

The Code of Containment for the Culture of Salmonids in Newfoundland and Labrador (herein referred to as "the Code") has been in effect since 1999. This Annual Compliance Report outlines compliance and inspection efforts as specified by the Code for the 2019 calendar year. This report outlines the effectiveness of the Code by outlining industry compliance to the requirements, the inspection efforts of FFA, the number of escapes (if any), and effectiveness of recapture efforts.

One of the objectives of the Code is to be forward-looking and to continually improve. This report will also indicate where improvements or revisions to the Code have been made. It should be noted that revisions are undertaken in consultation with industry and the federal and provincial government. The Aquaculture Liaison Committee meeting is the mechanism where such revisions are tabled for discussion.

The Code has also been recognized domestically and internationally for its robust approach and principles related to containment, innovation, reporting and training. The Code has been proven to be an effective management program and leading document to address containment and escapes.

3.0 Industry Overview

The salmonid aquaculture industry in Newfoundland and Labrador in 2019 consisted of three farming operations growing Atlantic salmon in the Coast of Bays region and one operation growing Atlantic salmon in the Bays West area. There were 97 farms licensed for Atlantic salmon and Steelhead production in 2019 and 27 farms were in active production.

Salmonid production decreased from 15,107 MT in 2018 to 14,167 MT in 2019. Infectious Salmonid Anemia virus (ISAv) and high consecutive water temperatures resulted in the depopulation of many farms.

In 2013, the industry transitioned to a Bay Management Area (BMA) system. BMA's are a strategy for sustainable aquaculture that respects fish health, the environment and the production needs of the industry. Each BMA is a geographic exclusion area where the intent is to isolate the farms in the BMA as much as possible to prevent the spread of any infectious agents. The BMA agreement was officially signed in 2014. It also enables stable and orderly management of industry practices to ensure environmental sustainability. Active farm locations as described below are reported based on the BMA that they reside in.

Note: The rainbow trout growing area is not included in the BMA system.

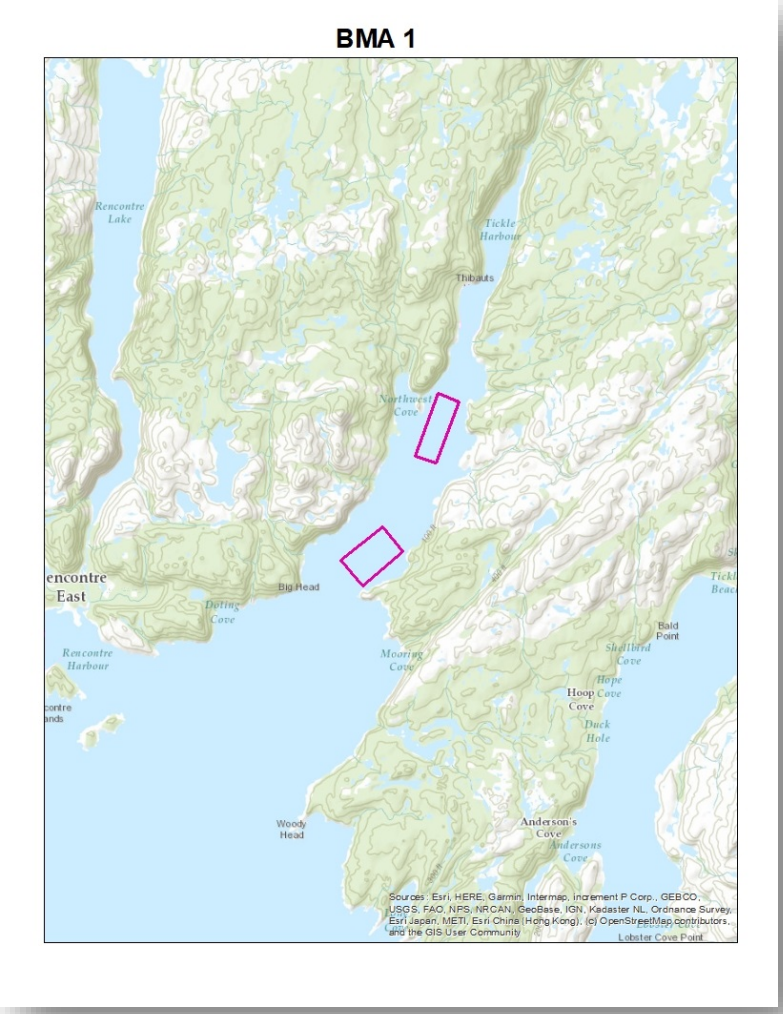
2.1 Number of Active Farms in the Trout Growing Region of Bay D'Espoir

There were no farms growing Rainbow Trout (Steelhead) in 2019.

2.2 Number of Active Farms in BMA 1 (Mal Bay/Fortune Bay East)

There were two active farms in BMA 1 growing Atlantic salmon.

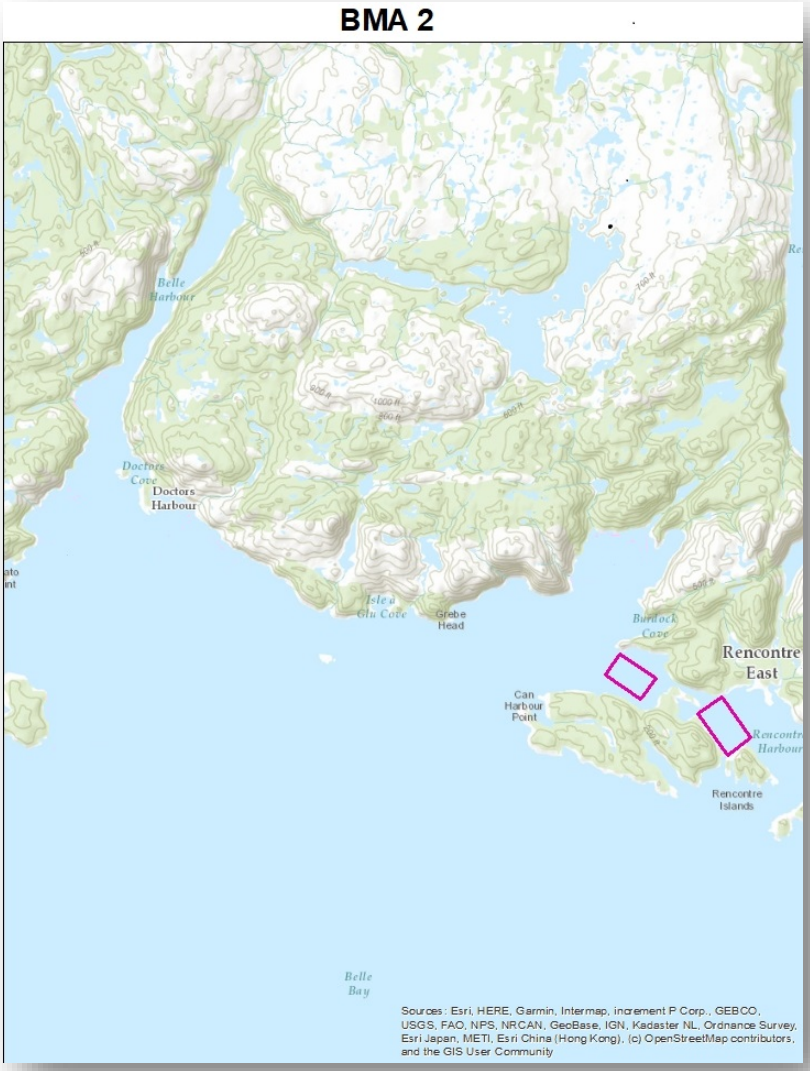
Figure 1: Active finfish farms in BMA 1 (Mal Bay) in 2019.



2.3 Number of Active Farms in BMA 2 (Rencontre Island/Fortune Bay Centre)

There were two active farms in BMA 2 growing Atlantic salmon.

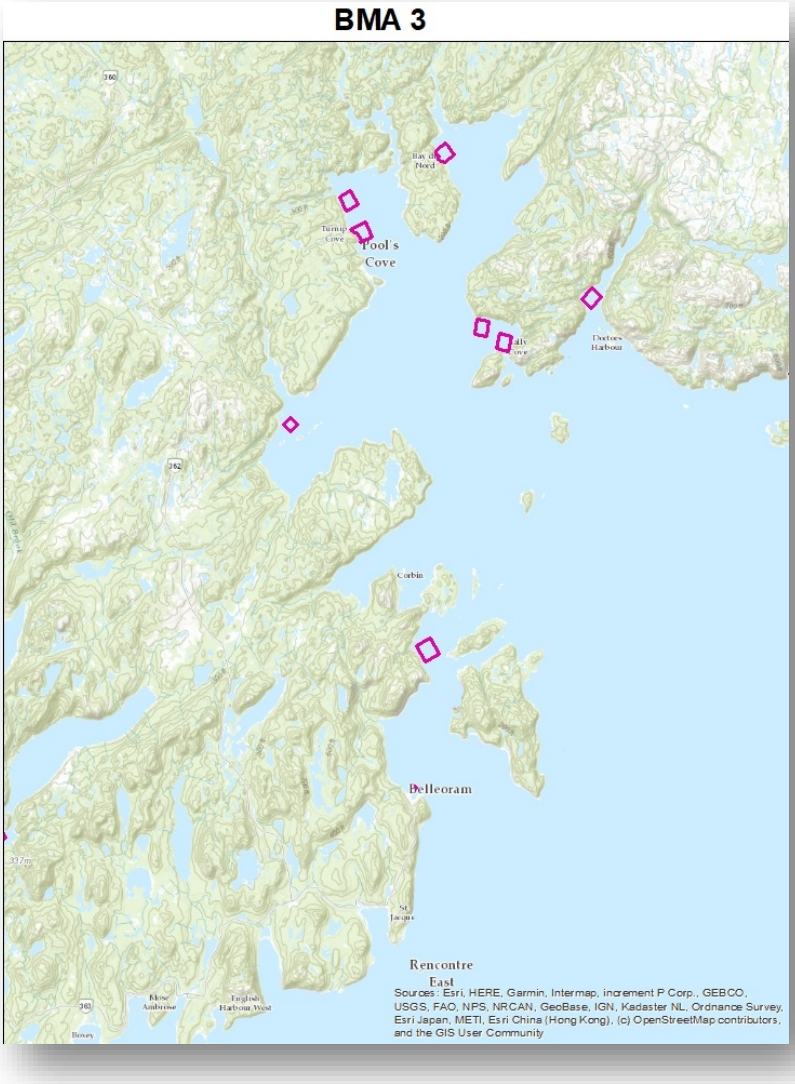
Figure 2: Active finfish farms in BMA 2 in 2019.



2.4 Number of Active Farms in BMA 3 (Fortune Bay West)

There were eight active farms in BMA 3 growing Atlantic salmon.

Figure 3: Active finfish farms in BMA 3 in 2019.



2.5 Number of Active Farms in BMA 4 (Great Bay de l'Eau)

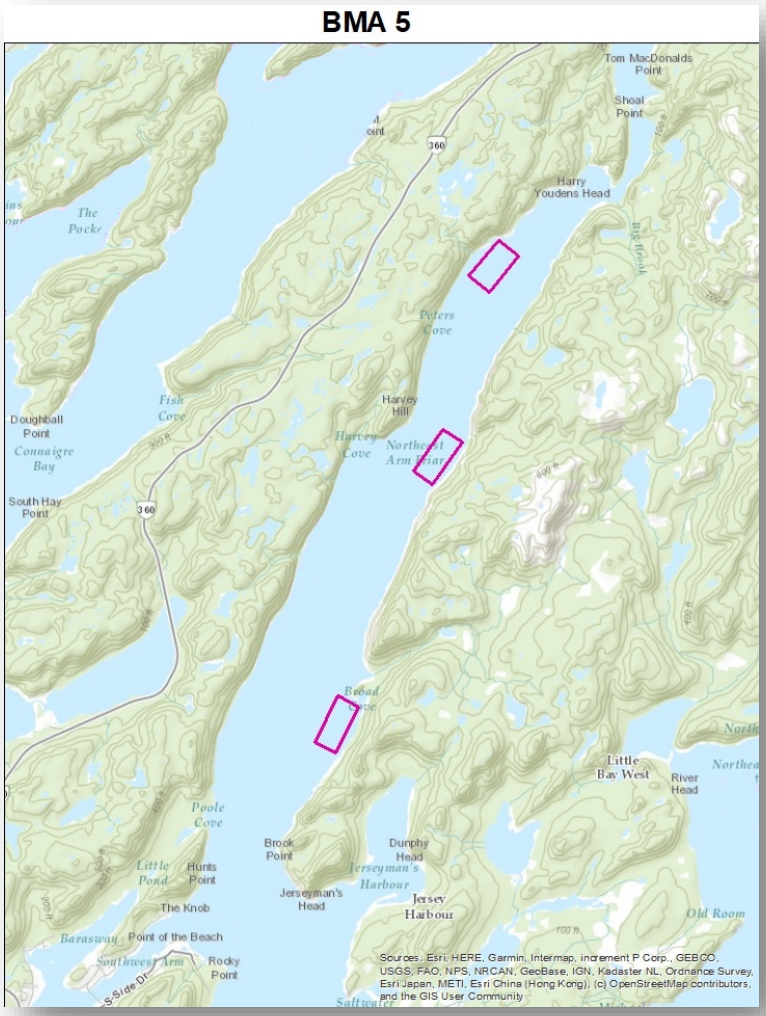
There was one active farm in BMA 4 growing Atlantic salmon.

Figure 4: Active finfish farms in BMA 4 in 2019.

2.6 Number of Active Farms in BMA 5 (Harbour Breton Bay)

There were three active farms in BMA 5 growing Atlantic salmon.

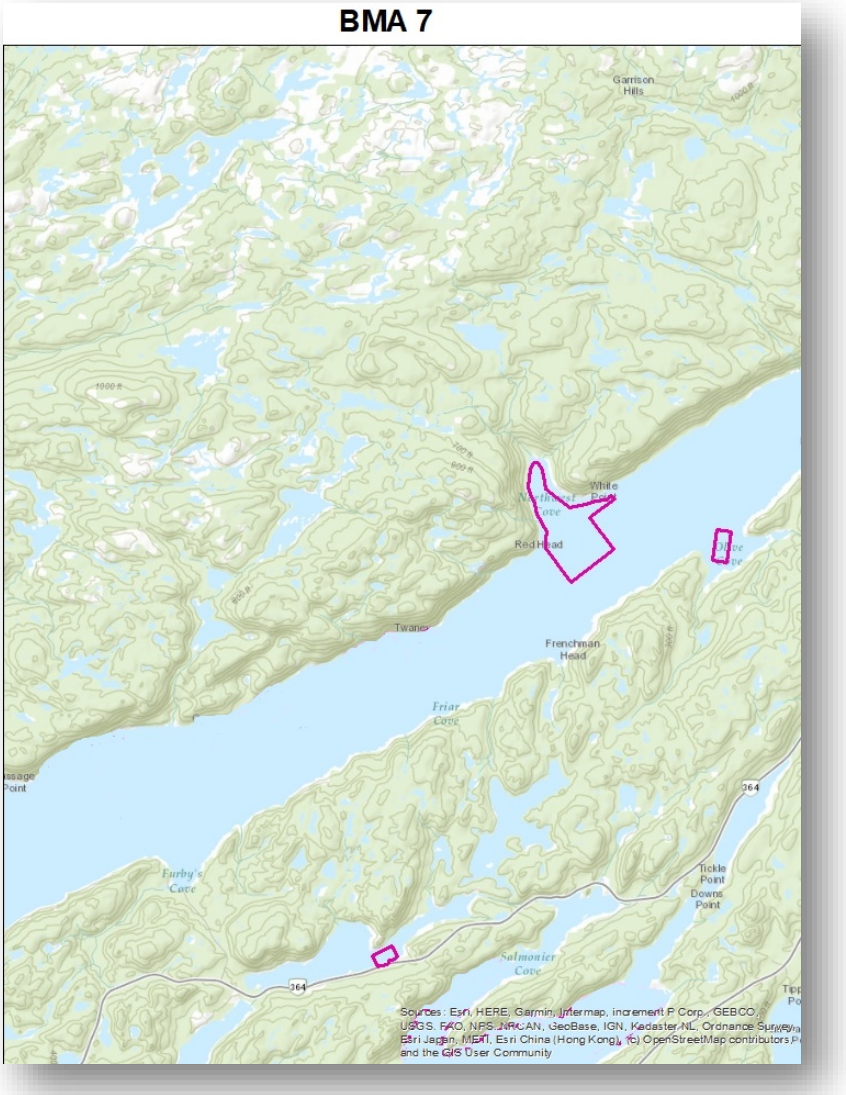
Figure 5: Active finfish farms in BMA 5 in 2019.



2.7 Number of Active Farms in BMA 7 (Hermitage Bay)

There were two active farms in BMA 7 growing Atlantic salmon and one freshwater farm.

Figure 6: Active finfish farms in BMA 7 in 2019.



2.8 Number of Active farms in BMA 8 (Long Passage)

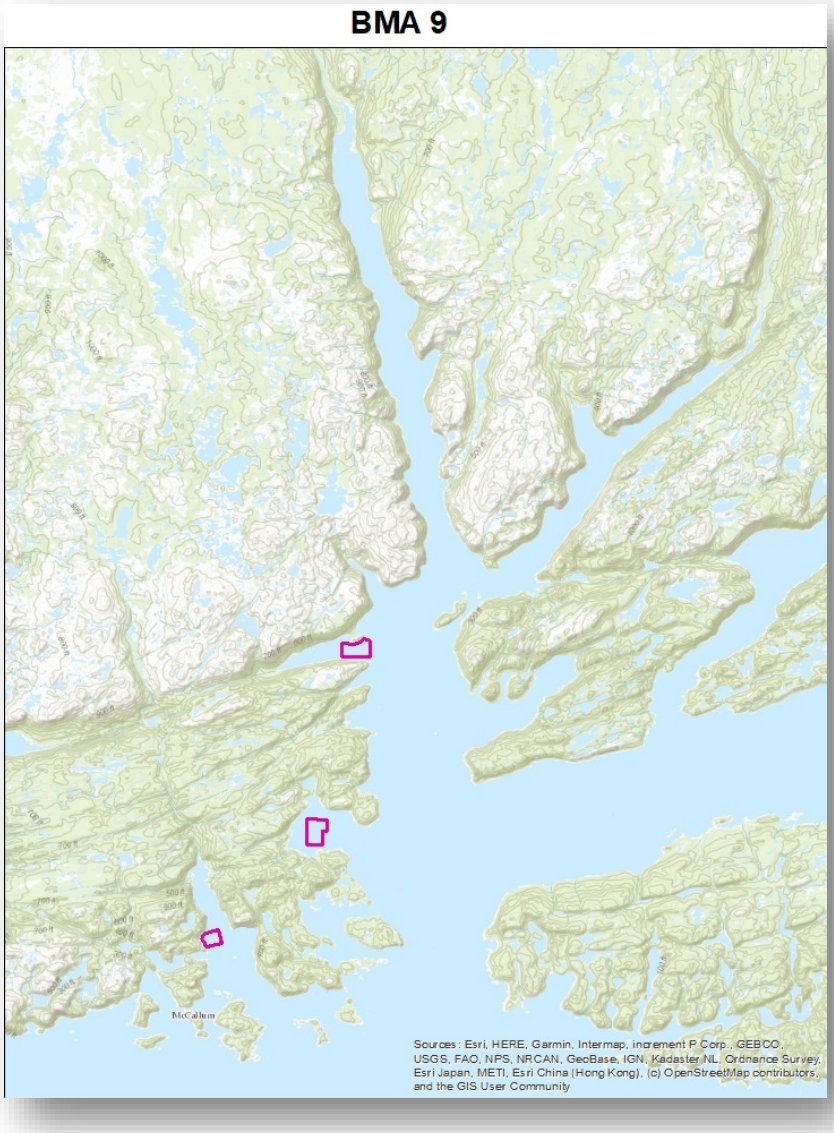
There were four active farms in BMA 8 growing Atlantic Salmon.

Figure 7: Active finfish farms in BMA 8 in 2019.

2.9 Number of Active farms in BMA 9 (Bay d'Espoir)

There were three active farms in BMA 9 growing Atlantic Salmon.

Figure 8: Active finfish farms in BMA 9 in 2019.



2.10 Number of Active farms in BMA 10 (Facheaux Bay)

There was one active farm in BMA 10 growing Atlantic Salmon.

Figure 9: Active finfish farms in BMA 10 in 2019.

Appendix 1 – Equipment Standards

A1.1 Nets and Net Testing

This section of the Code addresses net strength and integrity. Historically, in Newfoundland, the cause of escape is due to equipment failure which has decreased since the introduction of the Code. Since the Code, the majority of escapes have been due to procedural breakdowns or human error such as when two nets are joined together in an improper manner resulting in the join failing and causing a hole in the net. The Newfoundland Code of Containment focuses heavily on nets in both this section and in Appendix 4 - System Inspections. Specific requirements for nets and net testing can be found in Appendix A1.1, page 11 of the Code.

Compliance:

The nets used for finfish aquaculture along the south coast are made both locally, nationally and internationally. They are made of dyneema, a nylon knotless material and in some cases contain a stainless steel core often treated with antifoulant.

Mesh sizes vary depending on the size of fish going into the cage. Nets over three years of age must be tested every 18 months. The following table provides a consolidated summary of the net inventories submitted by a company for 2019. See Page 17 of the Code for the 4 Point Stress Test Inspection form used for net testing. Please refer to Appendix A1.1, page 14 for net strength standards.

Net Inventories	Number of nets
Total number of nets in inventories	313
Number of nets over 3 years of age	136
Number of nets under 3 years of age	125
Number of nets of unknown age*	52
Number of nets audited	178
Nets in use during spring inspection**	209
Nets in use during fall inspection**	58

*Nets of unknown age are treated as if they are over three years. Therefore, they are required to be tested to determine if they are suitable for use as outlined under the Code. Nets under three years of age do not require testing.

** Refers to farm System Inspections, see Appendix 4 of the Code of Containment and page 16 of this report.

Not all nets in inventories are in actively in use at the same time. FFA has verified that nets in inventories in 2019 were tested by a net testing agent *or* were under three years of age. Each company's net inventory is audited to ensure nets are tested and to verify net age. Net tag numbers are recorded during system inspections and cross-referenced with the net inventories each individual farm submits.

A1.2 Cage Types

Three types of cage designs were in use in 2019. The first and most common type of cage designs are the circular High Density Polyethylene (HDPE) plastic cages. These are manufactured locally to national and international industry standards and have proven to be very reliable in the Newfoundland and Labrador environment. They are manufactured in several sizes; however, they are most commonly found in 70m, 90m, 100m and 150m circumference sizes. The second type of cage designs used are square systems, made of both steel and HDPE; however, these are slowly being phased out of use in favour of the HDPE circular cages. The third type of the cage designs system uses a combination of steel and HDPE and is manufactured and installed to meet the Norwegian aquaculture standard NS9415 and is manufactured by Aqualine.

Compliance:
One new type of cage system was deployed during 2019 - Aqualine's Midgard system

A1.3 Mesh Sizes

Industry continues to use mesh sizes that meet or exceed the minimum size retained per mesh size as determined in "Determination of the Appropriate Cage Mesh Size for Retention of Salmonid Juveniles" by the Memorial University of Newfoundland's Marine Institute to determine the appropriate mesh size for containment of all life stages of salmon that will be introduced onto farms. This study was completed in 2000 and verified industry practices. Mesh sizes of nets to be used during production are listed in the cage culture application form for all licensed farms. FFA does not perform audits or inspections on this aspect of the Code.

A1.4 Moorings

This section of the Code addresses mooring components. Mooring failure has not been identified as a cause of escapement in the Newfoundland and Labrador aquaculture industry. Mooring inspections are not currently covered under the Code. Attempts at mooring inspections were made in the past using remotely operated underwater vehicles (ROV) but they did not yield reliable results. Mooring systems have changed substantially over the last number of years, with companies utilizing larger systems with more robust anchorage. Farm holders monitor their own systems and regularly perform maintenance and replacement of the systems. The current Code requires that the company submit a Mooring Maintenance and Replacement Plan annually for each farm in production or newly installed mooring system. Updated plans will be required upon replacement of a farm system. See Form A.2 within the Code.

Compliance:
All Mooring Maintenance and Replacement Plans were submitted for farm in production in 2019.

Appendix 2 – Inventory Monitoring and Reconciliation

Industry members are required to submit an annual inventory review to FFA for the calendar year. The review is to be submitted at the beginning of the next calendar year (e.g. Inventory reconciliations for 2019 will be submitted in January/February 2020).

Compliance:
There was full compliance in 2019. Industry wide, the 2019 Inventory Reconciliations tracked four-year classes of fish, starting with an inventory total of 8,422,965 salmonids and ended with 6,164,214 salmonids. Data from companies indicated that there were both inventory shrinkages and inventory surpluses. Evidence of shrinkage or surplus is only determined after a cage has been completely emptied by either harvesting or grading out (transfers). A review by FFA of shrinkage and surpluses has shown that shrinkage and surpluses vary by species and year class of fish.

Table 2: Example of company submitted inventory reconciliation.

Cage Number	Starting Number of fish	Year Class	Number of Fish Introduced	Number of Fish Mortalities	Number of Fish Removed /Harvest	Number of Fish Removed/ Transfer	Counting Deviation	Number of Fish Escaped	Fish Remaining
1	30372	2017	0	978	32603	0	3209	0	0
2	34448	2017	0	1282	34412	0	1246	0	0
3	28137	2017	0	1339	28809	0	2011	0	0
4	32698	2017	0	1261	32153	0	716	0	0
5	28550	2017	0	2865	28069	0	2384	0	0
6	33105	2017	0	1088	33517	0	1500	0	0
7	27942	2017	0	704	28557	0	1319	0	0
8	32186	2017	0	970	33032	0	1816	0	0
9	27623	2017	0	818	28336	0	1531	0	0
10	27816	2017	0	620	29536	0	2340	0	0
11	36232	2017	0	1250	36649	0	1667	0	0
12	28546	2017	0	691	29542	0	1687	0	0
TOTAL	367655		0	13866	375215	0	21426	0	0

Table 2 is an example of a particular cage grouping which shows a sample of the inventory reconciliation exhibiting both shrinkages and surplus (positive or negative deviations); counting deviations. The example illustrates the inherent errors involved in fish numbers. Counting deviations are a result of counting errors when stocking, grading or during mortality removal. These are a result of the limitations inherent in the technology used to count fish. Typically, with the most current technology, counting errors of up to 5 per cent are experienced. These technological limitations result in over and under counting of a cage population, or counting deviations. As seen in Table 2 above, 12 cages exhibited a surplus. Overall, the farm had a surplus of 21,426 animals. During their production

cycle, from egg to being harvested, populations of fish are counted multiple times. For example, fish are counted within a hatchery as the fish move through their growth cycle, from egg to smolt, and again when they are moved to sea cage farm. As the fish are moved from the hatchery to sea cages, they are counted again, and this number is officially reported to FFA. All mortalities that are retrieved over the course of the grow-out are noted and the final harvest numbers counted. All of this information is provided to FFA in an annual Inventory Reconciliation submission. Additional sources of error include mortality that is not captured such as winter mortality that is not recovered due to inclement weather and individual mortality degradation. There are non-regulatory incentives for companies to maintain accurate inventory records including third-party certification bodies (e.g. Best Aquaculture Practices -https://www.bapcertification.org/) and for insurance purposes. Failure to maintain accurate inventories will result in financial loss to a company. Finally, each fish that is lost through escape will also result in financial loss.

Code of Containment - Inventory Reconciliation - Species – 20xx

Company Name:_____

Contact Name:_____

Company Address:_____

Company Telephone: (709)_____

Company Fax: (709)_____

Signature:

Aquaculture Farm Licence #'s:_____

Farm Locations:_____

Number of Active Cages:_____

Start Date: January 1, 20xx

End Date: December 31, 20xx

Cage Number	Starting Number of Fish	Year Class	Number of Fish Introduced	Number of Fish Mortalities	Number of Fish Removed/Harvest	Number of Fish Removed or Transfer	Counting Deviation	Number of Fish Escaped	Fish Remaining
1									0
2									0
3									0
4									0
5									0
TOTAL									

Note: Farms used during this year included

Note: Use additional pages as required.

Appendix 3 – Ice Protection

The industry continues to use overwintering farms proven to be protected from moving ice.

Compliance

The industry has not applied for any new overwintering farms where moving ice may be an issue. The Code requires that new seasonal farms be reviewed by FFA for the potential of damage from moving ice. New seasonal farms may require ice booms. Existing overwintering farms at Roti Bay are farms proven to be protected from moving ice.

Appendix 4 – System Inspections

FFA is required to complete seasonal inspections on each farm in operation. Inspections usually occur in late spring and late fall after cages are secured on farms for that growing period.

Season	Number of farms inspected	Number of cages/nets on farm	Number of issues recorded
Spring	27	209	29
Fall	9	58	14

Only farms that are engaged actively in culturing fish are inspected. If any farm has been quarantined, FFA will follow protocols as set out by the Canadian Food Inspection Agency (CFIA) and the provincial Aquatic Animal Health Division (AAHD). System inspections include:

1. Visually checking all nets near the surface for any holes and tears.
2. Recording each net tag number.
3. Checking nets to verify if they were tied into the cage collar.
4. Physically checking each cage on site by walking around the entire cage and checking its condition. This walk around includes checking the rails, stanchions and cage collar for structural integrity, excessive wear and major cracks.
5. Visually checking surface moorings for excessive wear and overall condition. This includes checking all visible lines, thimbles, shackles, chains, and compensator buoys.

Compliance:

Spring – There were 29 incidents recorded:

- Six incidents were cage posts that were missing or cracked. Follow-up inspections confirmed all necessary repairs were completed or the cages in question were replaced. In all instances, the potential for escapes was minimal.
- Five incidents were holes high in the jump net that did not pose an escape risk. Farm staff were directed by inspectors to complete repairs while the inspection was ongoing.
- Four incidents were cage collars that were cracked/split. Each of these incidents was forwarded to the Licensing, Inspections and Quality Assurance Division of FFA and a directive letter was issued. Follow-up inspections confirmed that the repairs were completed.
- Three incidents were broken hand rails. Follow-up inspections confirmed all repairs were completed or the cages in question were replaced. In all instances, the potential for escapes was minimal.
- Three incidents were net checks that were not completed in the 90 day timeline. After investigating it was determined that when the 90 day window for net checks arrived the temperatures were so cold that performing the checks would have resulted in increased mortalities. Checks were completed promptly when temperatures allowed.
- Two incidents were missing weekly site surface checks.
- Two incidents were jump nets sagging or not being tight enough. Inspectors directed farm workers to rectify the issue and farm workers were advised that non-compliance would not be tolerated.
- Four incidents were untied waterlines. Inspectors directed the waterlines to be tied up during the course of the inspection and observed the work being completed.

Fall – There were 14 incidents recorded.

- Seven incidents were cage posts that were missing or cracked. Follow-up inspections confirmed all repairs were completed or the cages in question were replaced. In all instances, the potential for escapes was minimal.
- One incident was a hole that was located high in the jump net that did not pose an escape risk. Farm staff were directed by inspectors to complete repairs while the inspection was ongoing.
- Two incidents were cage collars that were cracked/split. Each of these incidents were forwarded to the Licensing, Inspections and Quality Assurance Division of FFA and a directive letter was issued. Follow-up inspections confirmed that the repairs were completed.
- Four incidents were broken hand rails. Follow-up inspections confirmed all repairs were completed or the cages in question were replaced. In all instances, the potential for escapes was minimal.

Industry fully cooperated with FFA during site inspections.

Appendix 5 – Predator Control Plans

Each aquaculture farm requires a plan to deal effectively with predators. Predators can be responsible for creating holes in nets, which may contribute to escapement. Effective fall 2002, Predator Control Plans were incorporated into all Aquaculture license applications.

Compliance:
Industry is fully compliant with this section of the Code. FFA has predator control plans for each farm on record.

Appendix 6 – Handling Practices

The salmonid industry handles fish in accordance with industry-wide accepted practices that are humane and guard against the escape of fish.

Compliance:
Industry is fully compliant with this section of the Code.

Appendix 7- Measures for the Recapture of Escaped Fish

DFO is responsible for the monitoring and implementation of this section of the Code. A Rapid Response Licensing Policy for the recapture of escaped fish was put in place in the fall 2002, replacing the former recapture plan of 1999 (please see current copy of the Code).

Since the Code of Containment has been in effect, escapes have decreased (see Table 3).

Table 3 Reported Escapes since 1990

Year	Salmon	Steelhead	Charr
1990	0	6600	0
1991	0	1700	0
1992	0	0	0
1993	0	0	0
1994	0	0	0
1995	0	31000	0
1996	140000	4000	0
1997	0	0	0

1998	69500	93000	0
1999	6300	8000	0
2000	0	45000	0
2001	0	0	0
2002	0	0	0
2003	6500	0	0
2004	0	0	0
2005	0	0	0
2006	0	0	0
2007	500	4400	0
2008	0	39653	0
2009	300	0	0
2010	0	32,443	69,827
2011	0	12,382	0
2012	0	0	0
2013	20,800	0	7513
2014	0	0	0
2015	1000	1000	0
2016	0	0	0
2017	<100	0	0
2018	3000	0	0
2019	0	0	0

DFO is currently concluding research into the fate and behavior of escaped farmed salmon to help guide recapture methods. In 2014, Post Escape Reporting was added to the Code. This allows FFA and DFO to conduct a review of each incident, its cause, whether the recapture efforts were successful and how/if the incident could have been prevented. It also provides a foundation for companies to adopt changes to prevent future incidences. In 2018, the threshold for reporting escapes was changed from more than 100 fish escaped to any loss of fish. In 2019, DFO began issuing recapture licences to each salmon farming company in advance of any escape occurring which minimizes administrative delays at the time of an escape. FFA added this requirement as a condition on salmonid licenses.

Compliance

No escapes were reported in 2019 and as a result no recapture efforts were undertaken.

Glossary of Terms

Cage – The floating structure in which nets are hung. Construction materials include galvanized steel and PVC.

Cage collar – Main attachment point for net and mail floatation for the cage structure. Any damage to this portion of the cage is of immediate concern for escapes.

Compensator buoy – A part of the mooring system that is key in ensuring that cages do not submerge as the buoyancy in the buoy has to be overcome before the cage will sink.

Hand Rail – Section of the cage from which the jump net is suspended.

Jump net – The portion of the net that extends up from the main attachment point to hang from the handrail. Its purpose is to prevent escapes from leaping salmon.

Net – Actual containment structure. Consists of the follow sections: net panels times four (four sides and bottom) and the jump net.

Stanchion/post – Vertical post from the cage collar that supports the handrail.