

Annual Compliance Report - 2011

on the

Code of Containment

for the Culture of Salmonids in
Newfoundland and Labrador



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11.0 EXECUTIVE SUMMARY:

The Newfoundland and Labrador salmonid aquaculture industry continues to grow. Industry production plans will increase salmonid production to an estimated 30,000 MT by 2014. The Department of Fisheries and Aquaculture manages the growth of the industry through policies and management plans designed to ensure the sustainability of the industry and environment. The Code of Containment is an integral part of the approach to successfully manage the growth of the industry.

The Code of Containment inspection/reporting program was conducted by the Department of Fisheries and Aquaculture (DFA) throughout 2011. Inspections occurred on the 42 active aquaculture sites between May and January. Reporting and inspection results are summarized below:

Nets and Net Testing:

385 nets were recorded in grower's net inventories in 2011. DFA staff recorded 228 nets on sites in the spring and 355 nets on sites in the fall. There was full compliance with net inventories and audits.

Cage Types: No new cage types were deployed this year.

Mesh Sizes: Appropriate mesh sizes were in use as per industry standard practice and in accordance with mesh size reports commissioned in 2000/01.

Moorings: A "Mooring Maintenance/Replacement Plan" was recommended to address moorings under the Code and was approved by the liaison committee for inclusion into the latest revision of the Code for implementation in 2012.

Inventory Monitoring and Reconciliation: Industry was fully compliant with this section of the Code. Industry wide, the inventory reconciliation covered approximately 10,052,899 million fish at the beginning of the year and ended with 14,311,727 million fish at year end.

Ice Protection: There were no new overwintering sites utilized in 2011.

System Inspections: DFA performed 26 site inspections in spring and 30 in the fall. 14 issues were recorded. These were rectified immediately.

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

Handling Practices: Handling and towing procedures are currently referenced in the industry Code of Practice document. It is proposed that handling and towing practices be written directly into the Code of Containment for implementation in 2012.

Measures for The Recapture of Escaped Fish: DFO is responsible for implementation of this section of the Code. Recapture efforts and technology require review and updating and are being discussed at ongoing meetings with industry. There was 1 confirmed steelhead escape event reported this year. Recapture efforts were not initiated following this incident due to the time of year and the size of the escaped fish.

Compliance with the Code continues to be high. However, in an effort to continually seek improvements and efficiencies; several recommendations to modify the Code have been made and approved through the Aquaculture Liaison Committee meeting in November of 2011. The changes are summarized in this document. These changes will be implemented in 2012.

1.0 INTRODUCTION:

The Code of Containment for the Culture of Salmonids in Newfoundland and Labrador has been in effect for eleven years. This Annual Compliance Report outlines compliance and inspection efforts as specified by the Code for the calendar year of 2011. This report will outline the effectiveness of the Code by indicating the compliance of the industry with the requirements, the inspection efforts of the Department of Fisheries and Aquaculture, the number of escapes and effectiveness of recapture efforts.

One of the objectives of the Code is to be “forward-looking and seek continual improvement”. This report will also indicate where improvements or revisions to the Code have been made. It should be noted that any and all revisions are undertaken with the full consultation of industry and both levels of government and public stakeholders. The Aquaculture Liaison Committee meeting is the venue where such revisions are discussed. It meets on an as-needed basis and last met in November of 2011 where updates to the Code were discussed and approved. Subsequently a revised Code was introduced in 2012 titled “Code of Containment 2012”.

The Code of Containment has also been recognized internationally for its adequacy in addressing the issue of escaped fish. The Code of Containment for the Culture of Salmonids in Newfoundland and Labrador is a recognized, effective, and leading document that addresses containment and escapes in Canada.

2.0 INDUSTRY OVERVIEW:

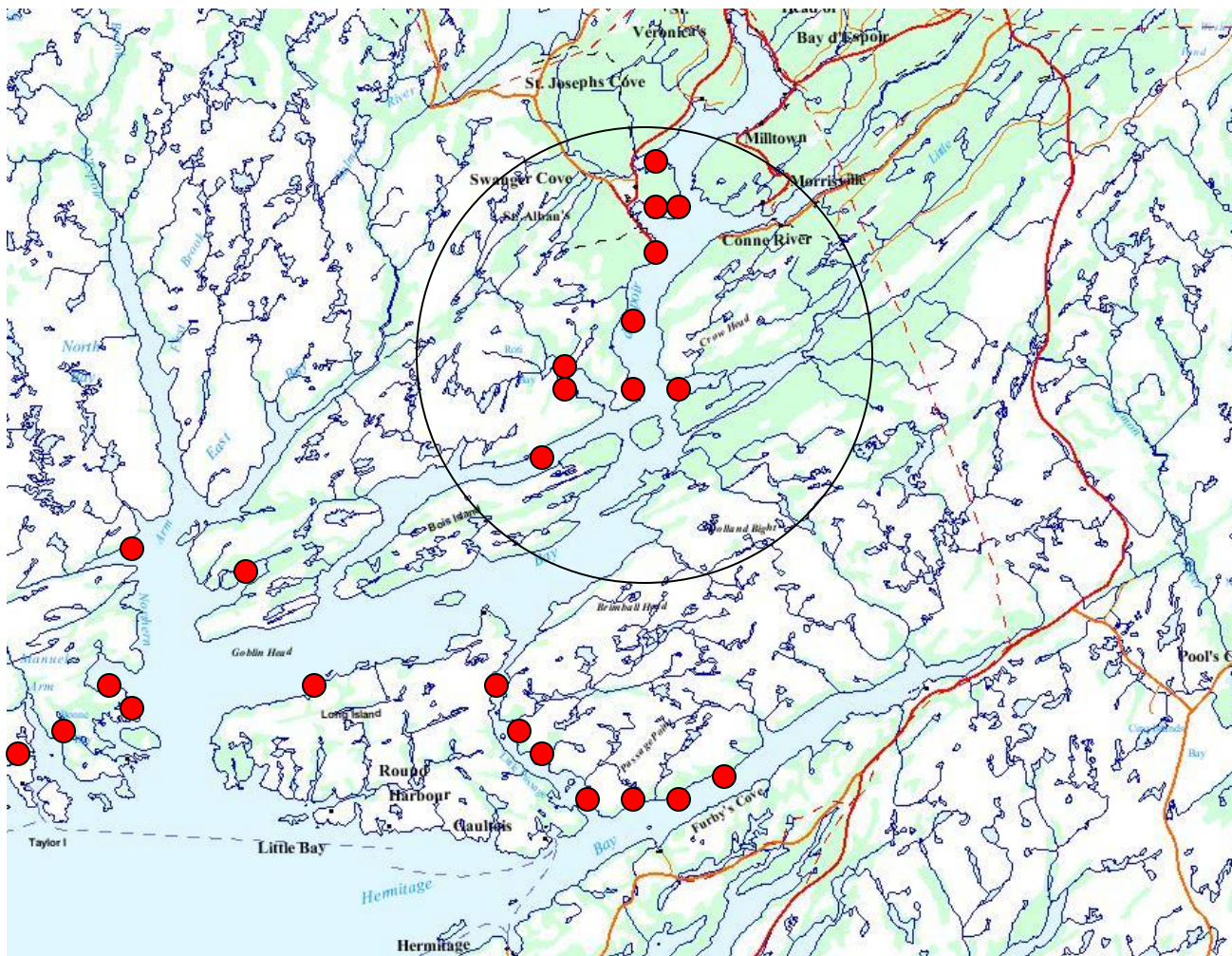
The salmonid aquaculture industry in Newfoundland and Labrador in 2011 consisted of 5 companies growing Atlantic salmon, Steelhead trout and char with farming operations in Bay D’Espoir, Hermitage Bay, Harbour Breton Bay, Great Bay de L’eau and Fortune Bay. There were 83 sites licensed for Atlantic Salmon and Steelhead production in 2011. There were also 2 char sites in use in 2011. 42 sites were in active production.

The production level of the industry is expected to increase over the next few years as sites that are licensed but have not been in production are developed. Increases in production in the salmon sector is ongoing with three growers (COS, GAGL, & NHSF) operating new salmon sites in 2011. Steelhead production remains steady. Production for 2011 salmonids was 14,264 MT.

2.1 Number of Active Sites In Bay D'Espoir in 2011

Both salmon and steelhead are grown in Bay d'Espoir and in 2011, there were 24 active sites (currently farming fish). The following figure indicates the 24 sites. Sites not circled are salmon sites.

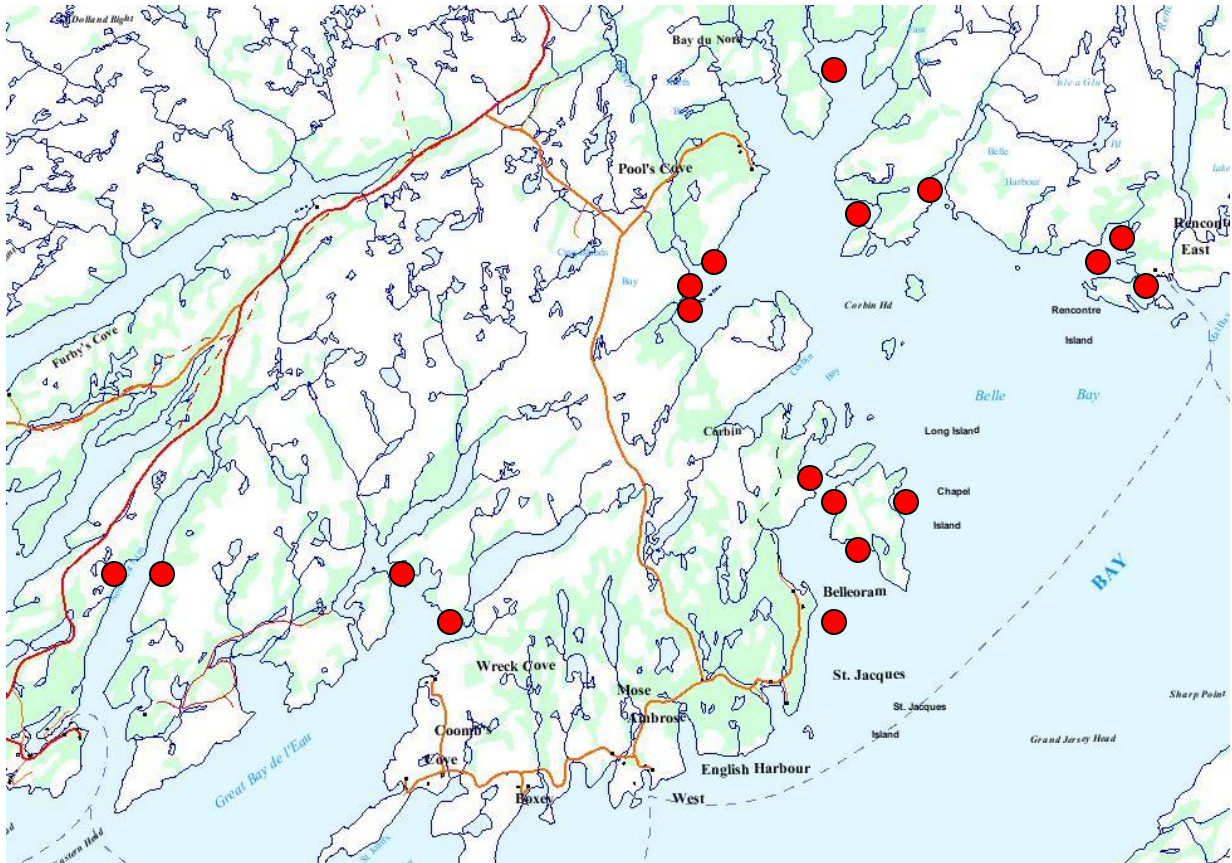
Figure 1: Active finfish sites in Bay D'Espoir in 2011.



2.2 Number of Active Sites in from Harbour Breton Bay to Fortune Bay and Great Bay De l'Eau

There were 18 active sites from Harbour Breton Bay to Fortune Bay in 2011 growing Atlantic Salmon.

Figure 2: Active finfish sites from Harbour Breton Bay to Fortune Bay in 2011.



3.0 APPENDIX 1 - EQUIPMENT STANDARDS:

A1.1 Nets and Net Testing

This section of the Code of Containment addresses net strength and integrity. Equipment failure and, in particular, net failure, has been recognized as a leading cause of escape incidents internationally. The Newfoundland Code of Containment focuses heavily on nets in both this section and in Section 6, appendix 4 - System Inspections. Specific requirements for nets and net testing can be found in Appendix A1.1, page 11 of the Code of Containment.

Compliance:

The nets used for finfish aquaculture along the south coast, made both locally and in New Brunswick, are of a nylon, knotless material and are 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 growers for 2011. See Appendix C for 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	385
Number of nets over 3 years of age	188
Number of nets under 3 years of age	131
Number of nets of unknown age*	66
Number of nets audited	105
Nets in use during spring inspection**	228
Nets in use during fall inspection**	355

* Nets of unknown age are treated as if they are over three years of age.

** Refers to site System Inspections, see Section 6, appendix 4 of the Code of Containment and page 16 of this report.

Not all nets in inventories are in active use at the same time. DFA has verified that nets in inventories in 2011 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 farm submits. In 2011, 8 nets on sites did not have valid net test documentation. These nets were discovered in the fall inspection, when it was too late to change the nets without risking fish health or escape. The nets were heavily monitored by farm staff until they were harvested out. All nets were removed for testing once fish were harvested.

A1.2 Cage Types

Two types of cage designs were in use in 2011. The first and most common is the circular High Density Polyethylene (HDPE) plastic cages. These are manufactured locally to national and international industry standards and have proved to be very reliable in Newfoundland's environment. They are manufactured in several sizes but are found most commonly in 70m, 90m and 100m circumference sizes as well as 150m. The second type of nets 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.

Compliance:

No new types of cage systems were deployed during 2011.

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 in 2000.

Compliance:

The study verified that industry was using appropriate mesh size. Mesh sizes of nets to be used during production are listed in the cage culture application form for all licensed sites.

A1.4 Moorings

This section of the Code addresses mooring components. Mooring failure has not been identified as a cause of salmonid escapes in the Newfoundland industry. Mooring inspections are not currently covered under this Code. Attempts at mooring inspections were made in the past (via ROV) but they were impractical and did not yield reliable results. Mooring systems have changed substantially in the last two years, with growers utilizing larger systems with more anchorage. Site holders monitor their own systems and regulatory perform maintenance and replacement of the systems. See Appendix 8 for changes made to this section of the Code in the 'Code of Containment 2012'.

4.0 APPENDIX 2 - INVENTORY MONITORING AND RECONCILIATION

Industry members are required to submit an annual inventory review to DFA for the calendar year. They are to be submitted at the beginning of the next calendar year (i.e. Inventory reconciliations for 2011 will be submitted in January/February 2012).

Compliance:

There was full compliance for the year 2011. Industry wide, the 2011 Inventory Reconciliations tracked three year classes of fish, starting with an inventory total of 10,052,899 salmonids and ending with 14,311,727 salmonids. Data from growers indicated that there were both inventory shrinkages and inventory surpluses. Evidence of shrinkage or surplus is only experienced after a cage has been completely emptied by either harvesting or grading out (transfers). A DFA review of shrinkage and surpluses has shown that shrinkage and surpluses vary by species and year class of fish.

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). This example shows an overall surplus, however, the example illustrates the inherent errors involved in fish numbers. Errors are a result of counting errors when stocking, grading or during mort removal.

Table 2

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/Transferred	Counting Deviation	Number of Fish Escaped	Fish Remaining
1	31593	2009	0	76	29934	0	-1583	0	0
2	29138	2009	0	243	27181	0	-1714	0	0
3	30463	2009	0	163	29554	0	-746	0	0
4	30474	2009	0	167	29535	0	-772	0	0
5	30832	2009	0	113	29871	0	-848	0	0
6	32254	2009	0	221	32582	0	549	0	0
7	31686	2009	0	124	29434	0	-2128	0	0
8	17529	2009	0	155	16636	2750	2012	0	0
9	25966	2009	0	89	25876	0	-1	0	0
10	26865	2009	0	48	30143	0	3326	0	0
11	25551	2009	0	150	24340	0	-1061	0	0
12	24674	2009	0	111	25172	0	609	0	0
13	26194	2009	0	130	27751	0	1687	0	0
14	26777	2009	0	129	28083	0	1435	0	0
15	28026	2009	0	110	29735	0	1819	0	0
TOTAL	418022	2009	0	2029	415827	2750	2584	0	0

Code of Containment - Inventory Reconciliation -SPECIES – 20XX

Company Name:_____

Contact Name:_____

Company Address:_____

Company Telephone: (709)_____

Company Fax: (709)_____

Aquaculture Site Licence #'s:_____

Site Locations:_____

Number of Active Cages:_____

START DATE: January 1, 20XX

END DATE: December 31, 20XX

Signature:_____

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									0
3									0
4									0
5									0
6									0
7									0
8									0
TOTAL									

Note: Sites used during this year included

Note: Use additional pages as required.

5.0 APPENDIX 3 - ICE PROTECTION

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

Compliance:

The industry has not applied for any new overwintering sites where moving ice may be an issue. The Code requires that new seasonal sites be reviewed by DFA for the potential of damage from moving ice. Any new seasonal sites may require ice booms. Existing overwintering sites at Roti Bay and Vyse Cove are proven sites protected from moving ice.

6.0 APPENDIX 4 - SYSTEM INSPECTIONS

The Code of Containment requires that the industry maintain ongoing inspections of their cage and mooring system structures. DFA is required to complete seasonal inspections on each site in operation usually in late spring and late fall after cages are secured on site for that growing period.

Season	Number of sites inspected	Number of cages/nets on site	Number of issues recorded
Spring	26	228	7
Fall	30	355	7

DFA performed 56 cage system inspections in 2011. Only sites that are engaged actively in culturing fish are inspected. System inspections include visually checking all nets near the surface for any holes and tears. The tag number of each net is recorded. Nets are also checked to verify if they were tied into the cage collar. Each cage on site is physically checked by completely walking around it and checking its condition. This includes checking the rails, stanchions and the cage collar for structural integrity, excessive wear and major cracks. Surface moorings are also visually checked for excessive wear and overall condition. This includes checking all visible lines, thimbles, shackles, chains and compensator buoys.

Compliance:

Only minor deficiencies were seen on sites. These included moved cage posts and nets in the water past the required testing period. Eight nets on sites did not have valid net test documentation (see Appendix 3, A1.1 compliance for details). In all cases, DFA advised the company to initiate repairs. Follow-up inspections were performed to confirm that the necessary repairs had been made. The industry fully cooperated with DFA during each site inspection. See Appendix 8 for changes made to this section of the Code in the 'Code of Containment 2012'.

7.0 APPENDIX 5 - PREDATOR CONTROL PLANS

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

Compliance:

Industry is fully compliant with this section of the Code. DFA has on record predator control plans for each site.

8.0 APPENDIX 6 - HANDLING PRACTICES

The salmonid industry handles fish in accordance with practices accepted industry wide that are humane and guard against escape of fish. The Industry Code of Practice outlines handling and transportation practices that are acceptable for the purpose of the Code of Containment. It is acknowledged that industry practices and procedures for fish handling have improved since the original Code of Practice was developed. Instead of referencing the Code of Practice, the procedures will be written directly into the Code. See Attached Appendices 6.1 and 6.2.

Appendix 6.1: Best Practices for Handling Fish for the Prevention of Escapes

All instances of fish handling should be undertaken in a manner that both safeguards the health of the fish being handled and minimizes the risk of loss of fish in the process. There are many routine farm practices that require fish handling, such as grading, weight sampling, transportation, well boat applications and harvesting. All staff should be trained in proper handling techniques prior to undertaking any handling-related tasks.

A common mitigation measure to reduce the likelihood of escapes in each handling instance is the use of a drop net. The following precautions must be taken prior to using a drop net:

- Nets must be inspected for holes, wear, and any other damage prior to use. If damage is detected, the net should be mended immediately, or suspended from use until such a time as it is repaired.
- Nets must be of sufficient size to cover entire work area.
- Mesh size should be small enough to contain the smallest fish being handled.

Grading

The requirement to grade fish is determined by a company's production strategy and scale of operation.

- The attending aquaculture veterinarian must be consulted regarding fasting requirements for this activity. Depending on the health status of the fish, the veterinarian may offer additional fish health advice.
- An aluminum or stainless steel grading table is utilized which sorts fish by size into different sea cages through directional troughs.
- A drop net must be used.
- If fish are being pumped from a cage to a vessel (and/or vice-versa), a drop net must cover the entire area under the pump pipe. The pipe should be double walled, or a net must be wrapped around the entire length of the pipe in case of breach.

Weight Sampling

Weight sampling is undertaken to determine fish growth and to facilitate adjustments to the feeding plan and inventory calculations.

- Fish must be collected using a dip net.
- A drop net must be used.

Sea Lice Counts

The requirement to count sea lice is determined by the attending aquaculture veterinarian and the companies' fish health management strategies.

- Fish must be collected using a dip net.
- A drop net must be used.

Transportation

Transporting fish, whether by sea or land, should be completed in a way that ensures the health and safety of the fish and limits the possibility of escapes.

- Continual monitoring of the fish during transport must be conducted. This will include, but is not limited to; monitoring dissolved gases (oxygen, carbon dioxide etc...), water temperature and fish behaviour. The attending veterinarian and the NL DFA – Aquatic Animal Health Division must be contacted if concerns or mortality are noted.
- Transporting fish cages must follow the Best Practices for Towing of Stocked Cages Appendix 6.2.
- If fish are being pumped from a vessel to fish boxes or cages (or vice-versa), a drop net must cover the entire area under the pump pipe. The pipe should be double walled, or a net must be wrapped around the entire length of the pipe in case of breach.

Well Boat Treatments

Well boats can be used for the purpose of bath chemotherapeutant treatments. This will occur under the guidance of a licensed aquaculture veterinarian and requires a veterinary prescription.

- Fish that are being pumped from a cage to a vessel (and/or vice-versa) require that a drop net cover the entire area under the pump pipe. The pipe should be double walled, or a net must be wrapped around the entire length of the pipe in case of breach.

Harvesting

Harvesting of fish can occur on site or cages may be towed to another location, such as a wharf, prior to harvesting.

- Dip nets, brailer nets or fish pumps must be used when harvesting fish
- A drop net must be deployed during all harvesting activity where there is risk of fish falling or jumping off of grading or slaughter tables.

Appendix 6.2: Best Practices for Towing Stocked Cages

Towing of cages from site to site must be undertaken in a manner that safeguards the health of the fish and minimizes the risk of loss of fish in the process.

The towing of cages requires carefully planned logistics and the development of contingency plans. Each individual move will be governed by numerous factors. There are several issues and practices common to most cage towing exercises. These include:

- Each tow must be approved by the Department of Fisheries and Aquaculture staff to ensure compliance with Bay Management Initiatives. The Aquatic Animal Health Division must be notified of fish movements to allow trace-back and trace-forward analysis, periodic audits and biosecurity requirements.
- Discussions must be conducted with DFA Aquatic Animal Health Division or the attending veterinarian to ensure health and safety of fish during planned towing exercises. The veterinarian will advise if it is necessary for fish to be taken off feed for the move, advise on the route of the tow and mitigation strategies to minimize stress on the fish. This advice will be dependent on a number of factors including, but not limited to; the health status of the stock, water temperature, duration of tow, species and size of fish.
- The towing route must be carefully considered prior to any movement. Considerations include, but are not limited to; duration of the tow, fish health status of the fish, the species and age of the fish, water temperature, water quality and water depth. The towing route must consider the location of other fish farms, processing plants and fishing activities. Towing routes that maintain a minimum 5km distance from these activities are preferred.
- Discussions must be conducted with local fishers to ensure cage towing will not interfere with traditional fishing activities.
- Each net must be inspected by divers or underwater cameras prior to towing to ensure structural integrity. A second inspection shall be conducted immediately following the tow, or as soon as is practicable.
- Each tow shall be undertaken by a minimum of two vessels, with one serving as a backup.
- Close attention shall be paid to securing tow lines to the towing vessel. Care must be taken not to secure the line too far aft, as this will restrict the towing vessel's ability to steer.
- The towing vessel must carry extra rope and a small roundabout (12' to 16').
- The tow line must be long enough to allow the wake of the towing vessel to dissipate before it reaches the cages in tow.
- Attention must be paid to tides, current, and wind forecasts, as some tows will take 24 hours or more. Short tows in Bay d'Espoir commonly take 4-6 hours.
- The nets of cages to be towed are to be shortened to reduce drag and to prevent "bagging" of the net while in tow.
- The nets must be clean and free from fouling to decrease drag, stress on the nets and increase water flow within the cage.
- A heavier set of net weights (anchors) should be used to prevent "bagging".

- Each towing vessel must have significant power to advance the cages in tow at an adequate speed to accomplish the tow.
- The speed of the tow, including calculation for current velocity, must not exceed the maximum speed of the slowest caged fish in tow. Preferable tows will occur “with the tide”. Towed cages must be checked frequently during a tow to ensure that the fish are keeping up with the speed of the tow.
- Any live fish or mammal that becomes entangled in lines or netting during transport must be immediately released to waters outside the aquaculture facility. Dead incidental catches must be disposed of in the same manner as farm mortalities.

9.0 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 of 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 overall (see Table 3). This is despite the fact that production of salmonids in Bay D’Espoir and Fortune Bay has increased from 572 metric tonnes in 1995 to 12,881 metric tonnes in 2011.

Table 3
REPORTED ESCAPES SINCE 1995

Year	Salmon	Steelhead	Charr
1990	0	6,600	0
1991	0	1,700	0
1992	0	0	0
1993	0	0	0
1994	0	0	0
1995	0	31,000	0
1996	140,000	4,000	0
1997	0		0
1998	69,500	93,000	0
1999	6,300	8,000	0
2000	0	45,000	0
2001	0	0	0
2002	0	0	0
2003	6,500	0	0
2004	0	0	0
2005	0	0	0
2006	0	0	0
2007	500	4,400	0
2008	0	39,653	0
2009	300	0	0
2010	0	32,443	69,827
2011	0	12,382	0

The current approach to recapture as specified in the Rapid Response Licensing Policy has never been proven to be very effective in actual escape events. There have been problems with fishing gear, delays between detection of losses and deployment of fishing gear, problems with subordination of recapture responsibilities to other on farm priorities

following escapement incidents , and policy limits that restricts fishing effort to the cage site only.

There has been little work done since 2000/01 towards improving recapture methods and technology. While there have been few escapes in recent years, discussions on the future directions for recapture is warranted.

Compliance

One confirmed escape event occurred in 2011. All escape and suspected escape events were reported to DFA and DFO.

- Steelhead escaped from cage after a hole was torn during a towing transfer.

In each instance corrective measures to repair and prevent further escape were taken. Due to the time of year and size and type of fish, DFO did not issue a directive to recapture the fish. DFA and DFO required a full reporting from each company of the cause of escape and measures to prevent future similar escapes.

10.0 APPENDIX 8- SUMMARY OF MAJOR CHANGES TO THE CODE OF CONTAINMENT:

Code of Containment, Appendix 1, A1.1,

Net testing:

Net testing is changed to once every 18 months.

Diver net Inspections:

Diver net inspections are to be performed every 90 days. Diver reports noting net inspections will be acceptable evidence of net inspections or a dedicated form can be developed.

Age of net audits and net testing Audit;

Aquaculture Development has engaged the AAHD to determine a statistically valid sample size for audits. Sample size recommendations are being developed.

Retired nets:

A list of all nets retired from the previous year must be listed with all net inventories.

Code of Containment, Appendix 1, A1.2

Cages

Net attachment:

All net attachment points securely tied to the cage with ½' rope polypropylene rope or rope of equivalent breaking strength (see table within Code).

Code of Containment, Appendix 1, A1.4

Moorings:

Growers will be required to submit a Mooring Maintenance and Replacement Plan. Updated plans will be required upon replacement of a site system. See form A.6 in revised Code.

In Code of Containment, Appendix 2

Inventory Reconciliation:

IR's will remain cage based for salmon and trout, however, trout will be based on year class instead of site with the sites used that calendar year listed and current location of cages listed.

Code of Containment, Appendix 4, System Inspections

DFA's audit/inspection procedures for diver and surface inspections.

DFA will audit and inspected diver net inspection forms and surface component inspections forms twice annually in conjunction with the twice annual site surface inspections that DFA conducts. During these inspections, DFA will perform the regular inspection of site surface components, recording of net tags and site diagrams but will also request site inspection and diver inspection reports.

Records will be assessed to ensure they are in compliance with the Code requirements. DFA inspectors will use form A.5 for these audits and inspections (see revised Code).

Formal cage system surface inspections:

Formal cage system surface component inspections will be performed one per week and recorded on form A.4 in revised Code.

Code of Containment, Appendix 6, Handling Practices

Handling and Towing Practices:

Instead of referencing the Code of Practice, the procedures will be written directly into the Code. See Attached Appendices 6.1 and 6.2.

Code of Containment, Appendix 7, Recapture:

Recapture

The requirement to notify DFA as well as DFO in the event of an escape or suspected escape has been added to the Code. The wording in the recapture section of the Code has been changed to specify that whether or not to recapture will be at the direction and discretion of DFO.