EXECUTIVE SUMMARY

The Ministry of Agriculture, Food and Fisheries (MAFF) is the lead agency for aquaculture development in British Columbia. Authorities and key functions also reside within other provincial agencies that have an interest in regulation of the industry. These agencies include the Ministry of Water, Land and Air Protection (MWLAP), the Ministry of Sustainable Resource Management (MSRM), BC Assets and Land Corporation and Fisheries and Oceans Canada (FOC).

The *BC Fisheries Act* and *Aquaculture Regulation* are administered by MAFF who have the responsibility to regulate the following aquaculture activities:

- escape prevention and escape response;
- farm record keeping requirements;
- net maintenance activities;
- general farm site operations; and,
- compliance with licence terms and conditions including approved site management plans.

Prior to October 31, 2000, regulatory requirements on the issue of escapes and those concerning farm practices were fairly general and only required that a licence holder take reasonable precautions to prevent the escape of fish and that the holder report an escape. In the absence of more detailed regulatory requirements, MAFF Inspectors had to review on-site activities and determine if these activities were consistent with industry standards in order to assess the state of compliance.

Last year's inspection report concluded general satisfaction with the state of compliance and did cite upgrades around the infrastructure of containment systems, development of policies and procedures on escape prevention and recovery, and standards for equipment design and net quality. The report noted, however, that the amended regulation would provide MAFF Inspectors with some objective and enforceable standards for future inspections.

With the introduction of new and more stringent regulations that came into effect on October 31, 2000 (*Appendix 4B*), MAFF Inspectors were provided with specific standards and guidelines that could be used to effectively measure the state of industry compliance. For the year 2001, compliance inspections were conducted at all active salmon farms in the province. This year's cycle of inspections were the first where companies were measured against the newly amended regulation.

What MAFF Inspectors encountered in the 2001 inspection cycle was an overall state of improvement in compliance compared to the 2000 inspection cycle, but recognition that the industry is in transition. The majority of provincial fish farming operators have made adjustments to bring themselves into compliance with the new regulatory requirements, and continual upgrades were noted by MAFF Inspectors for 2001 in the areas of containment system infrastructure, escape procedures, and net quality and equipment design.

EXECUTIVE SUMMARY

The most prominent area of concern identified during the 2001 inspection cycle was the inconsistency between approved site specific management plans and actual on-site operations. Specific concern has been raised with industry over production levels at some sites and it is expected adjustments will occur at these sites, either through correction of production levels to appropriate levels, or through approval requests for appropriate levels.

Another common area of non-compliance was the absence of written net maintenance records on site. 48 percent of farms were identified as non-compliant with net maintenance, marking and record keeping requirements. In most cases, however, the non-compliance issue related to written records for nets not being maintained as required and other elements had high levels of compliance.

In general, industry response to this year's assessment of compliance and necessary follow up has been favourable. In most cases where non-compliance has been identified, companies have been cooperative and quick to respond.

It is expected that overall compliance rates for companies will improve during the upcoming cycle of inspections for 2002. Government has recently been examining the *Aquaculture Regulation* in the context of providing a more streamlined and performance-based regulation that does not jeopardize important environmental values, particularly in the areas of waste management, fish health and escape prevention. It is expected the changes will come into effect on or before April 30, 2002, and will enable MAFF Inspection staff to assess compliance against these new environmental standards.

MANDATE

A. OVERVIEW OF AQUACULTURE LICENSING AND COMPLIANCE PROGRAM

The Aquaculture Licensing and Compliance program's mandate recognizes the need for transparency and accountability relative to MAFF's licensing and compliance functions in the province. This mandate is met by the application of an integrated licensing and compliance program that applies unfettered personal and institutional independence decision-making principles to meet identified environmental standards.

A key function of the Aquaculture Licensing and Compliance Branch is the responsibility to receive, adjudicate and issue commercial seafood licences and permits for the following industries:

- finfish aquaculture operations and hatcheries, including freshwater operations;
- commercial seafood activities, including fish buying stations, fish and marine plant processing and cold storage facilities; fish vendors; and fish brokers;
- commercial harvests of marine plants, wild oysters and non-tidal commercial fisheries.

The Aquaculture Licensing and Compliance Branch also has the responsibility to:

- monitor, inspect, enforce and report on commercial fisheries and finfish and shellfish aquaculture industries.

Licensing:

The provincial government, as part of the salmon aquaculture policy framework, recently identified 11 salmon farms for relocation as a result of social, environmental, or economic concerns. The provincial government announced in 2001 a second round of sites, 25 in total, that will be relocated based on the same identified values.

Relocation of some existing salmon aquaculture operations are expected to mitigate impacts to environmental values and ensure compliance with regulatory environmental standards. As part of this initiative, government is developing a guide for completing Site Applications that will outline more stringent siting, monitoring and reporting requirements. It is expected that the Site Application guide will be released this year.

MANDATE

With respect to the review of new salmon farm licence applications, including relocations, the licensing procedure is both thorough and complex. Considerable review is completed to determine if the proponent's application meets identified policy criteria. General principles guiding the deliberations on salmon farm applications include: fairness; transparency; efficiency; and accountability.

The key values that are applied and considered by licensing officials include:

- protection of public health and safety;
- protection of the environment; and
- sustainable economic development.

The licensing policy, attached as *Appendix* 6 to this report, provides the guideline applied by the licensing authority in considering licence applications.

Inherent in the licensing decision review process is consideration of the past or demonstrable performance of the applicant which includes a review of compliance history. This includes consideration of the following factors:

- whether the applicant has had any previous convictions under relevant provincial legislation;

- whether the applicant has been the subject of any licence suspensions, cancellations or refusals to licence pursuant to the *Fisheries Act* (BC);

- whether there are any outstanding fees or royalties owned to the Crown with regard to current or previously held aquaculture licences; and,

- whether the applicant has the necessary experience and qualifications in the aquaculture sector.

Information and data collected during annual inspections, the dive audit program and through previous investigations provide licensing authorities with critical information relative to the past or demonstrable performance of the applicant.

MANDATE

Compliance and Enforcement:

The compliance and enforcement regime for MAFF Inspection staff includes application or promotion of the following elements:

- awareness, education, promotion and training activities;
- promoting industry best practices, developing cooperative partnerships and agreements contributing to government objectives;
- conducting monitoring, inspections and audits;
- conducting investigations on alleged legislative and or licensing violations; and,
- public reporting on the compliance status of salmon farm inspections.

Recent enhancements to the compliance program have included:

- enhanced regular inspections of all active finfish aquaculture farms;
- recent introduction (year 2000) of the dive audit program, described in more detail later in this report;
- implementation of a licensing and enforcement case file tracking system;
- implementation of a 24 hour toll-free escape reporting line (1-877-223-4673);
- enhanced training for inspections staff; and,
- enhanced vessel fleet for improved all weather access to marine sites and improved Remote Operating Vehicle capability.

MAFF will continue to look for opportunities to implement enhancements in its compliance program in order to meet our commitment for an aquaculture industry that has high standards for environmental protection.

B. LEGISLATIVE AND REGULATORY FRAMEWORK

Many Acts and Regulations the industry is subject to are non-specific to aquaculture and cover a broad range of industrial activities. Some of these are currently administered by the Ministry of Water, Land Air and Protection (MWLAP) and include the *Firearms Act, Pesticide Control Act, Waste Management Act, Water Act* and *Wildlife Act*. The (*BC) Fisheries Act* and *Aquaculture Regulation* are more specific to aquaculture and are administered by MAFF.

The authority provided under the (BC) *Fisheries Act* provides MAFF the ability to license operations and regulate on-site farming activities and provides MAFF with the authority to set out licensing requirements, which include terms of licence, species and production limit approved for each operation, and any additional terms and conditions. The *Aquaculture Regulation* governs the operational aspects of the farm.

Aquaculture Regulation:

As part of the Salmon Aquaculture Review's recommendations, an amended regulation came into effect on October 31, 2000. These regulations contain detailed information that cover operational aspects of the salmon farm. They are found as Appendix 2 titled "Standards of Practice for Marine Fin Fish Aquaculture Escape Prevention and Response" and are attached to this document as *Appendix 4B.*

These new regulations include more comprehensive requirements for the salmon farm operator. They include specific requirements on frequency of net inspections, inspections of containment systems, predator control and avoidance, boat operations, net monitoring and inspection, dive inspections, anchoring systems, escape prevention and response policies, harvesting and processing requirements and more detailed and complete documentation and record keeping requirements. In general, the new regulation requires the operator to be more accountable for on-site activities.

The amended regulation was developed to reflect current trends in industry and in many cases, parallel the current best practices provided for in the Code of Practice developed by industry.

MANDATE

While recognizing the benefits of the October 31, 2000, *Aquaculture Regulation* amendment, streamlining and updating regulations are necessary in order to meet our public interest objectives. As a result of inspections and other industry assessments it is expected a more streamlined and performance-based *Aquaculture Regulation* will be in place on or before April 30, 2002, in time for the 2002 inspection cycle. More detailed discussion on the proposed regulatory changes are provided for in the summary discussion.

BACKGROUND OF INDUSTRY

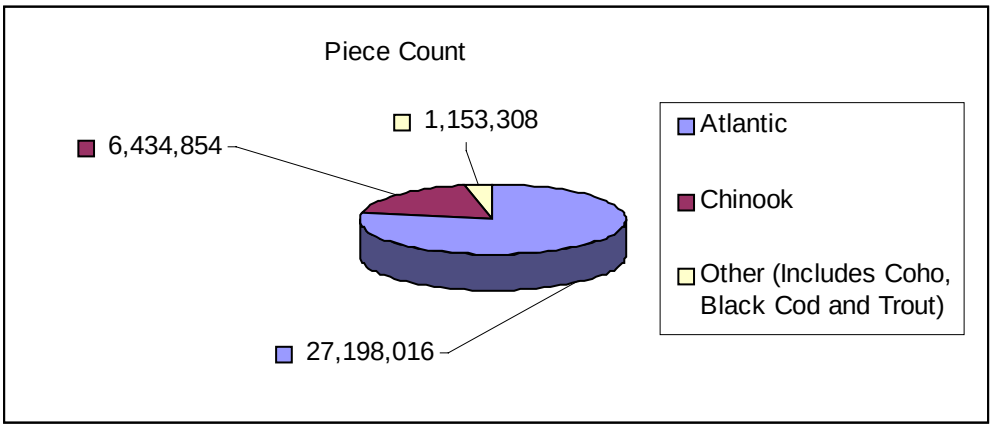
Seafood processing information collected by MAFF statistics staff indicate that in the year 2000, total landings and production for farmed salmon was estimated at 49,400 tonnes. This volume equates to a landed value of $281.7 million and a wholesale value of $320 million.

The total landings and production levels for farmed finfish are from 121 licensed marine aquaculture farms. The majority of licensed tenures are located in four principal areas of the province:

- Northern Vancouver Island – 38 sites;
- East Coast of Vancouver Island – 33 sites;
- Clayoquot Sound – 26 sites;
- Sechelt coastal waters – 10 sites; and,
- the remaining sites are scattered in various locations throughout British Columbia coastal waters

Of the 121 licensed sites, for the 2001 inspection cycle, 83 were operational or "active" and the remaining sites were fallow for this inspection cycle. "Fallow" sites are defined as finfish aquaculture farms that are inactive. Keeping a site fallow is a strategy applied to allow the seabed to recover from any organic input prior to stocking the next production cycle, and is used to ensure operations are compliant with performance-based waste standards prescribed by MWLAP.

The following graph provides the breakdown for species currently being held on provincially licensed fish farms.



GRAPH 1

METHODOLOGY

INSPECTION ACTIVITIES

While inspections can occur at any time during the year, most annual inspections are completed between the months of May to October. The objective of these inspections is assess compliance with regulatory requirements and licence terms and conditions as set out in the Aquaculture Licence by attending and inspecting each operating farm site.

During the on-site inspection, Inspectors interview company officials and review the farm's operational procedures and maintenance records for completeness and compliance with the regulation. The Inspector also performs an above-water visual examination of the site, including a perimeter inspection of each containment pen and infrastructure including anchors, walkways and other associated hardware. In addition, spot dive audits are conducted at randomly selected sites where a dive team is contracted to review the underwater portion of the containment and anchoring system as described later in this report.

The primary inspection categories include:

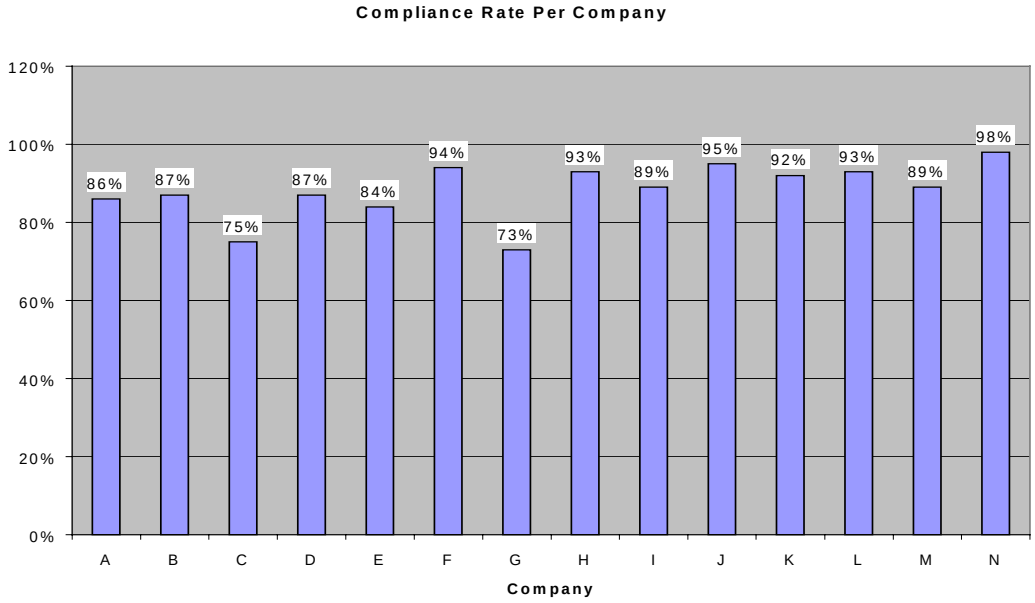
- review of management plans;
- therapeutant use and drug record keeping;
- stock inventory records and record keeping;
- net maintenance; marking and record keeping;
- frequency of net inspections including diver inspections;
- escape prevention program and escape response program; and,
- farm site operations including net cage deployment, weighting systems, boat docking, used of catch nets, feed storage and predator control.

Appendix 2 provides a copy of the Fish Farm Inspection Checklist used by MAFF staff in 2001.

2001 COMPLIANCE TABLE – NUMBER OF SITES IN COMPLIANCE

The graph below provides a summary of average compliance percentage rate by company. The company list and number of farms inspected are provided in *Appendix I.*

The graph illustrates the overall compliance rate of all companies in relation to violations noted at each of their operating sites. These sites were measured against the regulatory requirements in the *Fisheries Act* (BC) and *Aquaculture Regulation*.



GRAPH 2

Note: *Legend A – N* represents the 14 marine finfish aquaculture companies and are set out in no particular order.

2001 COMPLIANCE TABLE – NUMBER OF SITES IN COMPLIANCE

The following table provides a detailed summary of issues examined and number of sites found in compliance. More detailed explanation on those areas examined follow in the next section of this report.

Compliance Issue Assessed On Site	Sites in Compliance (of 83 inspected)
Management Plan Compliance to Aquaculture Licence:	
• Full compliance to approved site Management Plan	33
Farm Site Records:	
• Maintenance of Stock Inventory Records	73
• Maintenance of Mortality Records	79
• Maintenance of Stock Source Identity Records	75
• Maintenance of Staff Training Records	59
• Ability to produce reports	78
Overall Net Maintenance, Marking and Record Keeping:	
• Tagging	71
• Tag Marking	74
• Net Written Maintenance Records	47
• Net Repairs Completed Immediately	80
• Regular Net Servicing	74
• Proper Storage (UV protection)	72
• Repairs other than nets	83
• Primary point of net attachment	66
• Jump net height	76
• Equipment – smooth surface	75
• Sufficient net weighting	81
• Appropriate mesh size	83
• Debris removal	83

2001 COMPLIANCE TABLE – NUMBER OF SITES IN COMPLIANCE

Compliance Issue Assessed On Site	Sites in Compliance (of 83 inspected)
Frequency of Net Inspections:	
• Above water checks (daily)	83
• Storm checks	77
• Dive checks upon fish introduction	83
• Maintenance of dive check records	75
• Regular hole checks	75
• Weekly mort collection	78
• Morts inspected	83
• Morts recorded	83
Escape Prevention:	
• Escape Prevention plans in place	83
• Escape Response plans posted	61
Farm Site Operations:	
• Designated docking site	73
• Docking site marked	61
• Docking site design	76
• Catch nets used during high risk activities	83
• Secure feed storage	83
• Walkways and systems clear of feed	83
• Use of spotters	83
• Proper large vessel moorage	83
• Predator control in place	83

The *Aquaculture Regulation* does not require that operators deploy predator controls. Information on predator control methods was gathered for statistical purposes and if necessary, to help determine patterns of predator attack.

Predator Control Methods:	
• Use of predator nets	40
• Use of shark guards	40
• Use of bird netting	64
• Use of sealed feed	53
• Other (may include electric fence, kill permits, dip nets)	31

COMPLIANCE RATES – REGULATORY AND LICENSING REQUIREMENTS

A. Management Plans

A management plan is a document that the farm operator is required to submit that specifies design and operation criteria of the fish farm. Management plan applications undergo an extensive review and once approved, form a condition of the Aquaculture Licence. Companies are required under the *Fisheries Act* (BC) to operate within the provisions approved in these plans.

Several important aspects of the plans that MAFF Inspectors reviewed for compliance this inspection cycle included the number and size of the pens that are on site and site configuration, the species being cultured, and the biomass or piece count permitted on site.

Of the 83 farms surveyed, 40 percent were in compliance with requirements of the management plans. Those out of compliance included 51 percent where site configurations were non conforming, 51 percent had in excess of the identified maximum allowable biomass and 2 percent had unapproved species on site.

The high level of non-compliance is in part due to high expectations that industry would soon be moving to an outcome-based performance model and that prescriptive indicators within the management plan would no longer be relied upon as the approved model.

Due to the uncertain time frame for the change to the outcome-based performance models, this year MAFF's approach was to enforce current levels as set out in site specific management plans. That is, all operators have been instructed to come into compliance, either by reducing production levels, or submitting necessary approvals via site management plan amendments for site configurations, biomass levels and/or species.

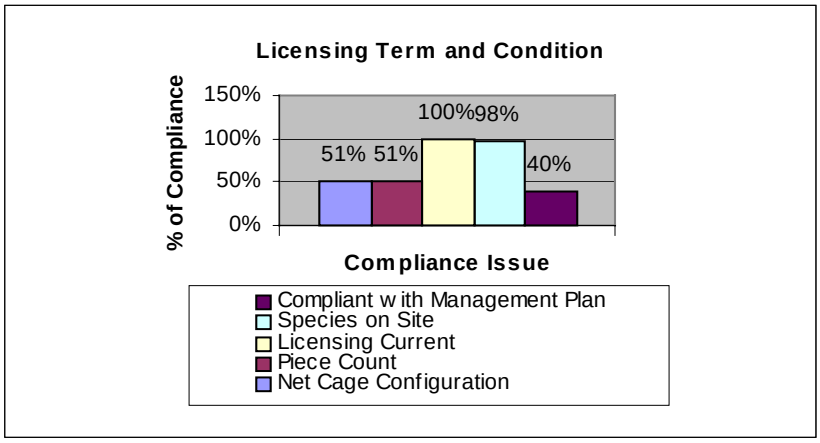
Companies identified as non-compliant in this area were notified of the requirement to update management plans or adjust operating practices to reflect their most recent approved management plans. It is expected that all companies will be in compliance during the 2002 inspection cycle, as the majority of farm operators have submitted updated management plans in response to this year's inspections.

COMPLIANCE RATES – REGULATORY AND LICENSING REQUIREMENTS

It should also be noted that performance based waste management standards are expected to be in effect on or before April 30, 2002 which should address the production level issue identified at this year's inspections. Nonetheless, it is a commitment of MAFF to ensure that site specific management plans reflect approved conditions as set out in the Aquaculture Licence, and the compliance and enforcement activities applied this year reflect this new approach.

The following graph indicates the levels of compliance to Licensing requirements including specific conditions of the management plan. It shows both the overall compliance rate as well as specific compliance rates to various factors including current licensing, approved species on site, piece count and net cage configuration.

Graph 4



B. Therapeutant Use and Record Keeping

There are specific regulatory standards pertaining to documentation requirements when administering prescription therapeutants to farmed fish. Documentation of therapeutants is an important record keeping requirement for the salmon farmer.

Proper withdrawal times must be observed. Records are kept that identify treatment and treatment schedules. Farm operators are therefore required to keep records of all drugs administered to farmed fish.

To satisfy this requirement, the operator must be able to demonstrate that all appropriate paper work has been completed to document and track the administration of these therapeutants.

This includes a log of:

- the therapeutants;
- how they were administered;
- the treatment schedule including the date treatment commenced;
- the date of last treatment;
- the location of the aquaculture facility;
- the species of finfish; and,
- the name of the veterinarian who prescribed any therapeutants.

The holder should also be able to produce a statement with specific information that accompanies the fish to the processing plants that provides verification that the withdrawal period has been complied with.

MAFF inspection results this year indicate that ten sites had fish that were being medicated at the time of inspection. Four of these sites had fish close to marketable size, being in the final quarter of the grow out cycle. Where fish had been medicated and documentation was reviewed, all but one site were found to be in compliance.

COMPLIANCE RATES – REGULATORY AND LICENSING REQUIREMENTS

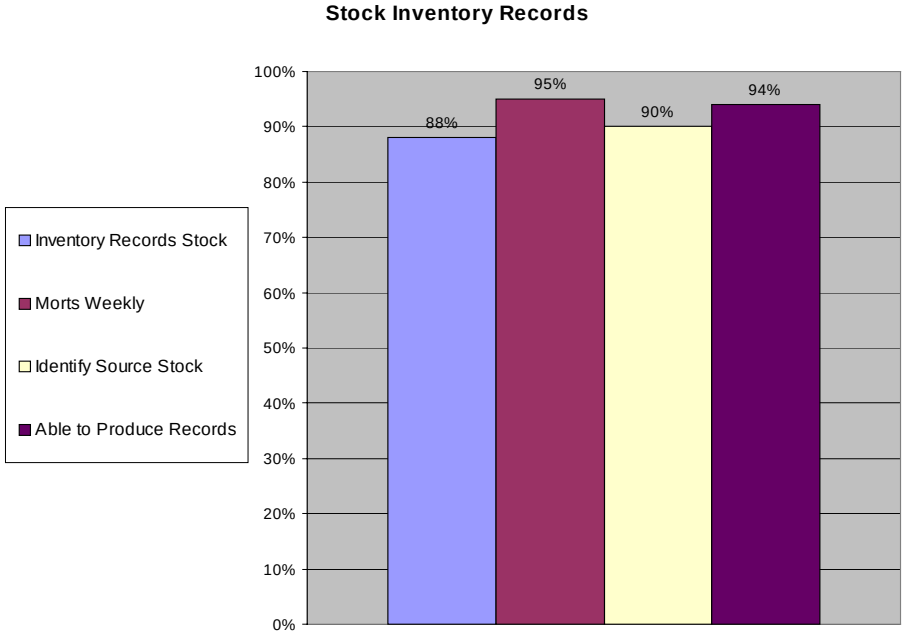
C. Stock Inventory Reports and Record Keeping

The *Aquaculture Regulation* requires that holders keep accurate and complete inventory records of stock on hand and require these records be maintained for each net cage on the system. These records must show the inventory introduced to the farm site and documentation should include date of entry, species, hatchery, size, strain and age of fish. Reconciliation for fish transferred in or out, escapes and mortality must be reconciled in these reports.

The objective of this requirement is for the farm operator to know at any given time what the stock levels are for each net cage on the farm. These records enable the operator to accurately report incidents of escapes and are also important for the statistical database that the ministry maintains.

The inspection team did not complete detailed forensic audits and reconciliation of inventories with paper documentation. Instead compliance was based on evidence presented by the farm operator that these records were being kept. Part of the regulatory requirement is for these records to be kept on-site and made available for the Inspector upon request.

The following graph shows the overall compliance to the various documentation and or reporting requirements for stock inventory that should be kept on the farm site. The graph includes stock inventory records, source of stock, weekly mortalities and the companies ability to product these records on demand.



Graph 5

COMPLIANCE RATES – REGULATORY AND LICENSING REQUIREMENTS

D. Net Maintenance, Marking and Record Keeping

The integrity of the containment net is an important factor in salmon farming. Nets must be able to withstand the rigours of the marine environment and weak nets are more susceptible to breakage and subsequent loss of fish. During the 2001 inspection cycle at the 83 operating sites, approximately 1,000 net pens were deployed and contained fish.

The amended regulation specifies that all containment nets are to be properly tagged, maintained and stored. Detailed written maintenance records are to be maintained on site for each net and these records must be kept for a period of two years after the net is retired.

Of the 83 sites inspected, 52 percent were in compliance with all net maintenance, marking and record keeping requirements. Compliance with storage, marking, repairing, and servicing and tagging requirements was high. Compliance with net record keeping, however, was low, 57 percent.

Net Marking:

To effectively document and maintain net history, the regulation requires that each net is to be marked in a unique and permanent manner. Depending on the manufacture date of the net these requirements differ. The objective remains the same, that being a net must be identifiable through a unique number. In this manner the complete history of the net can be tracked and made available in the event it is requested by a MAFF Inspector.

Record Keeping:

Net maintenance records are comprehensive and must include all work that has been completed on the net. This includes regular out-of-water servicing and any on-site repairs once the net has been deployed. Regulations require that specific information is collected and maintained for each containment net. This includes the net inventory number, initial date of deployment, the accumulated time in the water, dates of in-water inspections, dates of on-site repairs and maintenance, including detailed reasons for repairs, dates of cleaning, dates and results of out of water complete servicing, stress testing and if applicable the date of retirement of the net pens. These records should follow the net and be available on site.

Maintenance and storage:

The regulation specifies the time period that nets have to undergo regular servicing. In general all nets are to be serviced and strength tested every 18 months, unless the fish are in a longer grow-out period. This service includes net strength testing, assessment of overall condition and any necessary repairs. Any nets deemed inadequate cannot be re-deployed as containment nets and should be disposed of or relegated to other purposes.

In the event a net is damaged after it is deployed, repairs must be made immediately. These repairs are to be noted in the maintenance record and form part of the history of the net. It is permitted to do temporary repairs on a containment net; however, any repairs that are temporary in nature must be replaced with permanent repairs as soon as is practicable.

Ultra violet rays from the sun have harmful effects on containment nets. A net left in the sunlight can deteriorate. Often the weak section of the net is in an isolated location that can be easily over looked during servicing and testing. The regulations require that nets stored on dry land must be in a manner that prevents exposure to UV light.

Photograph 1

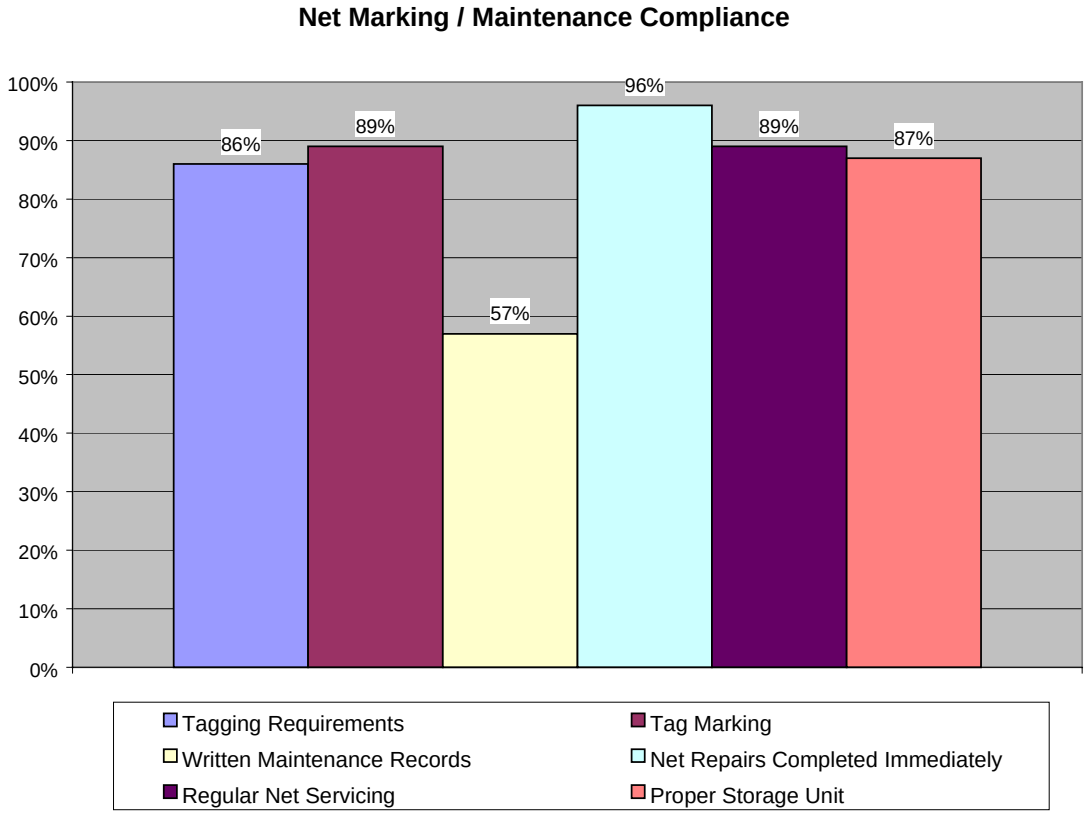
Net properly bagged and protected from UV.

While some companies conducted their own net testing and servicing, 87 percent of the companies relied on professional net lofts for their net assessment, maintenance and storage needs. Most companies dealing with specific net lofts would rely upon the net loft for storage of any unused nets. Storage at these facilities is under cover and out of the elements.

COMPLIANCE RATES – REGULATORY AND LICENSING REQUIREMENTS

The following graph illustrates the compliance rates to the various net maintenance and documentation requirements. It includes compliance to net tagging, on site maintenance, regular servicing requirements, net storage and relevant documentation requirements.

Graph 6



COMPLIANCE RATES – REGULATORY AND LICENSING REQUIREMENTS

E. Frequency of Net Inspections

Above Water Checks:

The regulation specifies that daily above-water inspections of net cages are required to ensure integrity of the system. These checks may include removal of debris that comes into contact with and damages the containment nets. In addition to the daily checks, storm checks are also required where winds exceed 55 knots. It is a requirement that this information be maintained in the daily maintenance logs.

Of all sites inspected, 100 percent verified that daily checks were being conducted. 93 percent of sites indicated that storm checks were being completed. It was not clear in all cases, however, that this information was being accurately recorded in the logs.

Dive Checks:

Once a containment net is in place, and prior to the introduction of fish, the regulation requires that a dive must be made to check the net for integrity and ensure that no damage to the net occurred during its deployment.

Once fish are introduced, the net must be checked by divers on a regular basis to ensure that the net is properly maintained. There was 100 percent compliance to this requirement for all sites inspected.

The frequency of these dive checks after fish are deployed is dependent upon the use of divers to collect mortalities. The supposition is that divers are able to do hole checks on their weekly mort dives. In this case dive checks on the nets are required on a monthly basis. Where divers are not used to collect mortalities, hole checks are required every two weeks.

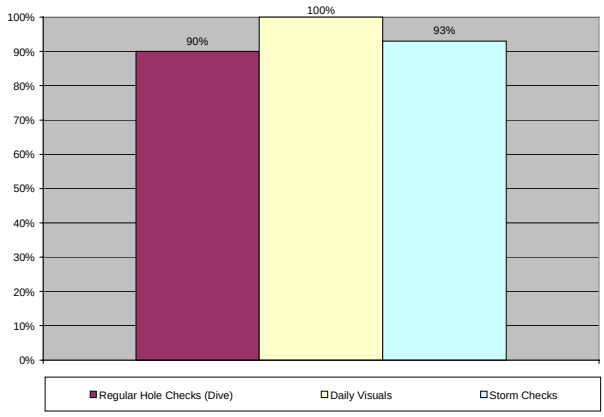
It is important that a distinction is made in the log when divers conduct separate hole checks as opposed to a combined mortality and hole check, and to identify them as separate functions. A diver's down time is often the measurement an Inspector will use, in conjunction with other factors such as size of the system and visibility, to determine if suitable time has been spent on system hole checks. It is a requirement that these checks be recorded in the maintenance logs.

In 90 percent of the sites inspected, companies were in compliance with this requirement. In cases where details were incomplete in the daily log and the Inspector could not clearly distinguish between mortality dives and hole checks, companies were cited as being out of compliance.

COMPLIANCE RATES – REGULATORY AND LICENSING REQUIREMENTS

The following graph illustrates the compliance levels for the type and frequency of net inspections required at the farm site.

Graph 7
Frequency of Net Inspections



Escape Prevention

Factors contributing to escape incidents have been largely attributed to the following six factors:

- system failure;
- boat operations;
- net failure due to the presence of predators;
- net failure due to poor or inadequate maintenance;
- net failure due to known or suspected vandalism activities; or,
- handling errors.

Appendix 5 provides some detailed summary information on marine escapes.

With this in mind, the annual inspection cycle is designed to carefully review on-site operations for activities that may contribute to escape events.

Every operator of a marine site is required to have a written escape prevention and response plan. These plans are site specific and are intended to address site specific concerns. These plans form part of the site's management plan and contain details describing escape prevention, escape response, predator avoidance, description of existing and proposed containment structures, plans for inspection and maintenance of containment structures and monitoring and reporting schedules. All staff must be trained in applicable elements of this plan and a copy of the plan must be available on every site. All sites inspected had escape prevention and response plans.

F. Escape Response

Every operator is required to have a written escape recapture plan. To initiate an effective escape response, it is necessary that staff are well trained in the elements of these plans. These plans must include step-by-step procedures for mitigating against further escapes and for reporting escapes. These plans must be posted in a visible location at the facility and the location and contents of this plan must be well understood by all staff.

In 73 percent of the facilities, plans were appropriately posted, and site staff were able to demonstrate appropriate knowledge of the contents of the plan.

Photograph 2

Escape recovery kit containing dedicated seine net and equipment to be used in the event of an escape.

G. Farm Site Operations

Mortalities:

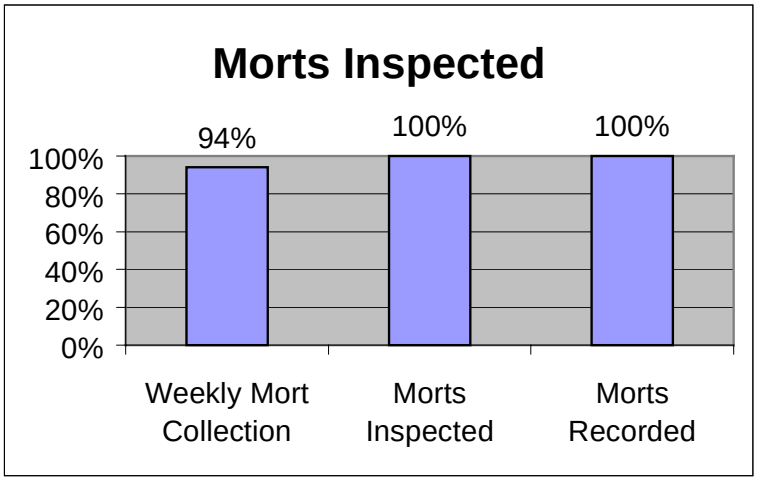
Fish mortalities are regularly encountered on salmon farms. It is a requirement that these mortalities are collected and disposed of in an appropriate manner. This is important not only from a health perspective but is also a predator avoidance mechanism. Mortalities left in the net cages can attract predators that may in turn damage nets in their attempt to get at the fish. Once collected, mortalities must be inspected for signs of predator attack, and it is required that the results are logged. If there is a repeat pattern of predator attacks the operator of the system is expected to initiate additional measures against predators to avoid net damage and loss of stock.

Mortalities are collected by divers at all farms. Ninety-four percent of farms were in compliance with the required frequency schedule.

COMPLIANCE RATES – REGULATORY AND LICENSING REQUIREMENTS

The following graph illustrates the compliance rate for the collection, examination and documentation of mortalities.

Graph 8



Net Cage Attachment Points and Jump Nets:

The regulation specifies that the primary point of attachment for net cages is at the water line rope. The water line rope is designed in a manner to support the heavy load of a containment net. Secured to this water line rope are numerous reinforced tie-off points that take the bulk of the strain on the nets once they are deployed. These are the primary attachment points for the containment net and are required to be secured to the walkway with lines that are sound and adequate to withstand the strain of the net. Nets should not be supported by the stanchions or uprights as these are normally not designed to withstand the load and can fail under extreme conditions. The regulation also requires that net stanchions and net cage railing are not used to moor large vessels that could cause damage during strong wind or tidal exchanges.

Jump nets are the portions of net that extend above the water and are designed to prevent fish from jumping over the containment system. The regulation specifies the height of these jump nets must extend at least one meter above the surface of the water.

Inspection results indicate 80 percent of sites are in compliance with respect to net cage attachment points. In some cases on individual containment nets, the tie off points may not all have been secured. The majority of the deficiencies in this area were usually the tie-off points in one corner of the system. Corners are often used by divers for access points to the net cage and occasionally these points may not be re-secured after a dive. Where tie-off issues were noted, these were identified as deficiencies.

There were no situations where large vessels were found to be moored inappropriately.

Jump nets are in place at all farms, with 92 percent meeting the height requirement. Failure to take stretching of new nets into consideration resulted in some non-compliance. New nets must be readjusted during the break-in period.

Net weights and attachment points:

All equipment that comes into contact with containment nets must have a smooth exterior designed to prevent snagging the net on rough edges that might result in tears and loss of fish. This includes both external weights and internal weights that are used as well as any attachment points that might come into contact with the containment nets. It is also important to maintain the equipment as heavy fouling with marine organisms can contribute to snagging or tears. Ninety percent of sites inspected were in compliance with these requirements.

The weighting system must be designed so that net weights are sufficient to prevent excess billowing of the net. A taut net is important, as billowing nets are more subject to becoming snagged as well as more susceptible to tears or damage from predators. Ninety-eight percent of sites were in compliance with this requirement.

The more common deficiencies noted included exposed shackle pins, rough un-trowelled concrete anchors, rock anchors in plastic containers used as internal weights and equipment and heavily fouling of marine organisms on anchoring equipment.

In investigations of incidents where fish have been lost or suspected losses have occurred, it has been found that some tears and subsequent loss of fish can be attributed to improper weighting or through contact with various components of the net weighting or system anchoring points. Industry is continually reviewing these aspects of containment structures and improvements are constant.

PHOTOGRAPH 3 - Typical concrete main anchor, used as external weight.

COMPLIANCE RATES – REGULATORY AND LICENSING REQUIREMENTS

Boat Docking

To reduce or eliminate potential damage to net cages from vessels travelling to and from farms, a specific docking site for vessels must be identified on the site. The regulation requires this docking site must be designed or located in a manner to prevent propeller damage to the cage systems and must have proper signage. Of the sites inspected, 73 percent had acceptable docking facilities designated and properly marked.

PHOTOGRAPH 4 - Properly designated and signed vessel docking area.

Catch nets

Catch nets are required to be used as a precautionary or secondary containment net when operators are conducting higher risk activities such as transporting, harvesting, grading, sampling and or moving fish. This is to mitigate against possible loss of fish due to human error or equipment failure.

All sites inspected either had equipment on-site or verified that catch nets were used during higher risk activities.

Feed Storage

To reduce the risk of attracting potential predators onto the net cage system it is important that feed is stored in a secure manner and that all walkways and pen systems are kept clear of feed.

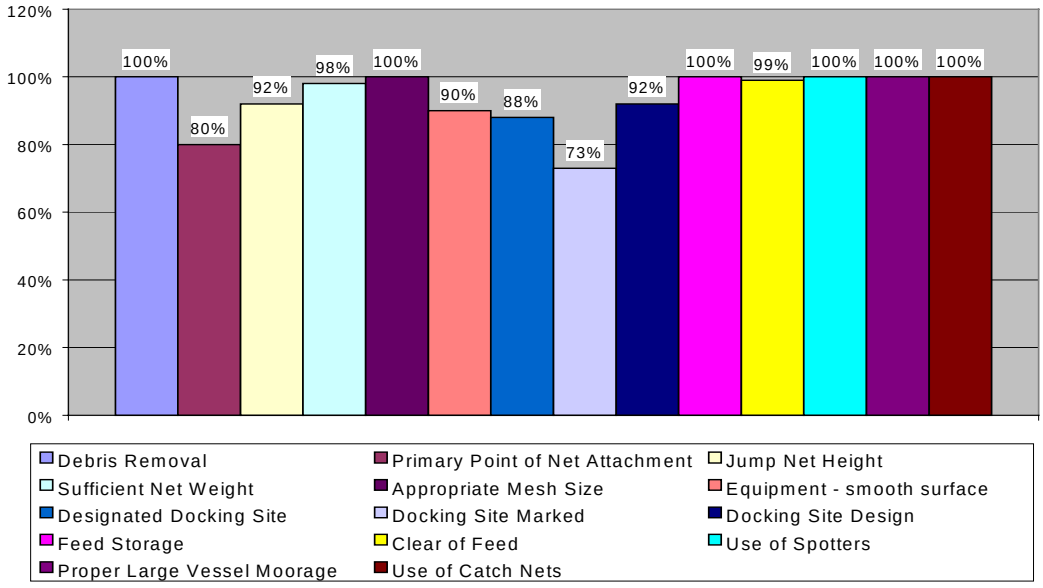
COMPLIANCE RATES – REGULATORY AND LICENSING REQUIREMENTS

All sites stored feed in a secure manner, and 99 percent kept their walkways and systems clear of feed.

PHOTOGRAPH 5 - Properly sealed feed containers.

The following graph indicates compliance to various operational requirements, including net cage attachment point, jump nets, net attachment points, net weight and equipment design, boat docking, catch net and feed storage.

Graph 9



Farm Site Observations

COMPLIANCE RATES – REGULATORY AND LICENSING REQUIREMENTS

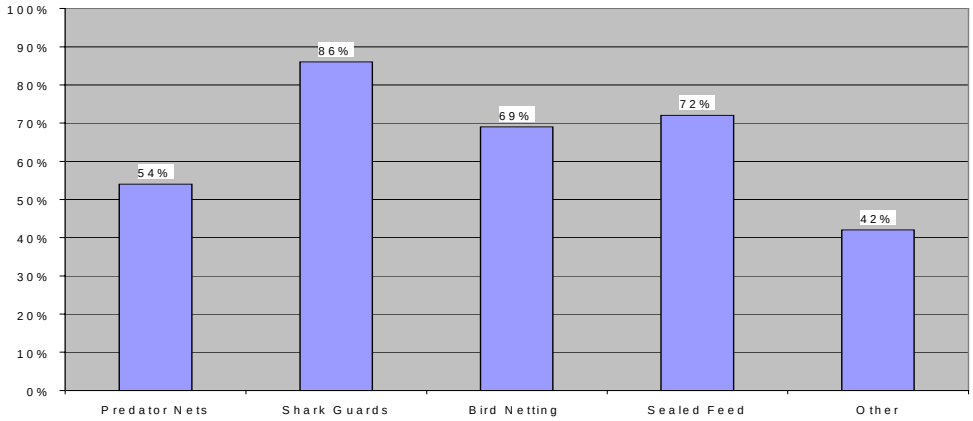
Predator Control

Although the regulation does not specify that salmon farms must deploy predator controls there is a requirement that mortalities must be checked for signs of predator attacks. If a pattern of predator attacks is established and mortalities are experienced at a specific location, holders must initiate measures to prevent net damage and loss of fish. Failure to comply with these requirements could be viewed as failure to take reasonable measures to prevent an escape.

Most farm sites inspected had some measure of predator deterrent in place. In some cases, two or more systems were in place. Common types of predator systems include predator nets, shark guards, and bird netting. Other measures reported to be effective deterrents include taut nets either from a weighting system, or in some cases, from the additional weight of antifoulant on the nets, kill permits and electric (otter) fences.

The following graph illustrates the four principal methods used as predator controls at the sites inspected.

Graph 10
Predator Control



PHOTOGRAPH 6 - Bird netting as predator control.

OTHER 2001 COMPLIANCE AND ENFORCEMENT ACTIVITIES

A. JOINT INSPECTIONS

In May 2001, MAFF Inspections staff participated in a joint inspection program with MWLAP, FOC, and representatives from the BC Salmon Farmers' Association Code of Practice. The joint inspections were conducted at three salmon farms in the Broughton, Clayoquot and Quadra Island areas. First Nation community representatives also participated in the joint inspections.

The inspections were arranged based on requests from interested parties to view the inspection process and provide input and comments relative to the upcoming 2001 inspection schedule. The joint inspections were considered of value and interest to the majority of participants, and opportunities for further joint training investigations or educational initiatives will continue to be supported and participated in by MAFF compliance staff.

MAFF Inspectors also participated in a number of inspections with MWLAP Conservation Officer staff during the 2001 inspection cycle. Approximately 22 farm site inspections were conducted with Conservation Officer staff, in order to review respective practices and reduce agency presence in the field by streamlining and coordinating inspection efforts.

B. PRE-INSPECTIONS FOR NEW APPLICATIONS AND RELOCATIONS

As outlined earlier in the report, a number of salmon farming sites were considered for relocation in 2001 as part of the Salmon aquaculture review.

When the licensing authority approves a new licence application, such as a relocation, a condition of licence prior to any introduction of fish is a satisfactory pre-start up inspection by a MAFF Inspector to ensure compliance with all regulatory and licence requirements. This includes a review of all components identified in the applicant's management plan, compliance with legislative and regulatory requirements and verification the company has met all licence terms and conditions and specific additional conditions.

In 2001, MAFF Inspectors completed four start-up inspections for relocated site applications.

It is anticipated that the recent announcement by government to consider new licence applications for marine salmon farms will follow the same policy guidelines applied for relocated farms relative to those farms selected for relocation. That is, a satisfactory pre-inspection by MAFF Inspection staff will be considered a term and condition of any new Aquaculture Licence.

C. DIVE AUDIT PROGRAM

MAFF has recently implemented a random dive audit program for the province's salmon farm aquaculture operations. These dive audits are site specific and unannounced.

Experienced dive teams attend a site with a MAFF Inspection team, spending approximately one day at each selected site, videotaping and examining various farm features below water. Aspects examined include condition of net pens and their repairs, anchoring systems, net weight design and installation, condition of lines and associated hardware and other below-surface features.

The purpose of the unannounced dive audit is to assess under-water farm features and ensure that the operator is in compliance with regulatory requirements and properly managing the underwater maintenance of the containment nets and anchoring systems.

In 2000/2001, a total of 10 dive audits were completed. Of the 10 sites selected, two were located in the Broughton Archipelago, two in Clayoquot Sound, two in Jervis Inlet and four in the Quadra Island, Campbell River area. Photographs from dive audits are included in this section of the report.

Issues identified during these dive audits included:

1) in some cases, external net weights were not properly attached, resulting in billowing of the containment net, increasing the risk of entanglement;

2) in some cases, containment nets were close to the main external weights and could potentially become entangled;

3) some internal net weights had sharp edges that could potentially damage nets through abrasion. In one case, rock bags for internal net weighting were being used;

4) in one containment net, tools and fishing implements that had been accidentally dropped were found entangled;

5) in some cases, chains and other anchoring hardware that had potential to contact the net were fouled with abrasive marine growth;

6) some temporary net repairs had not been replaced with permanent repairs and some net damage had not been addressed as required; and,

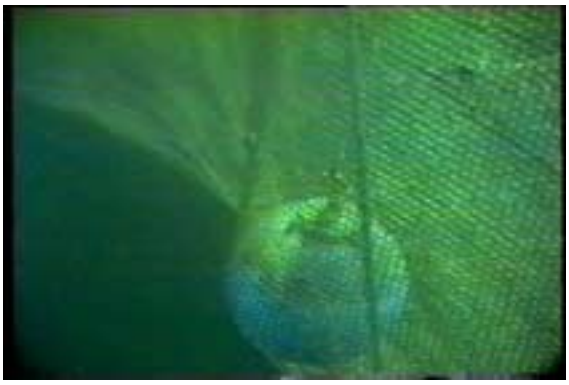
7) at one site, loose lines were present that provided the potential for entanglement with vessels operating on site.

The farm site operators that were the subject of the dive audits were provided with the results and advised to implement necessary remedial action.

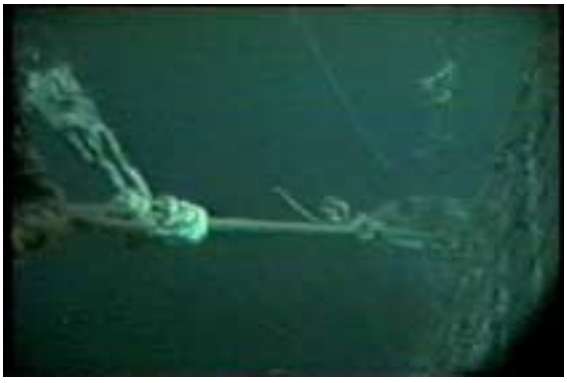
The dive audit program for 2002 has recently commenced. Last year's results will be reviewed and compared when completing the round of dive audits for 2002. Results will be provided in the "2002 Inspection Report on Salmon Farms".

DIVE AUDIT PHOTOGRAPHS

Round cannon ball style weight used as an external weight. More typically found on smaller net cages. One line goes to the surface as a tie off point. The other line is looped through and tied off to the containment net. This line is used to tension tie off points on the net and helps retain the shape of the system.



Smooth cannon ball style weight used internally on net pen systems to help retain the shape of the net cage. The number used varies according to size of the net cage and local conditions.



Plastic 202 litre drum filled with concrete. These are heavier weights used as external weights on the system. One line goes to the surface to support the weight. The other two lines are tied off to the net pens, looped through the chain link and run to the surface. The tension on the nets can be adjusted by tightening these lines. The number or external weights used varies according to the size of the pen and local condition.

Typical net repair either done on site by divers or at the net loft.

Atlantic salmon inside containment system.

OTHER 2001 COMPLIANCE AND ENFORCEMENT ACTIVITIES

D. BRANCH INVESTIGATIONS

MAFF Fisheries Inspectors are responsible for conducting in-depth investigations of possible licence violations. For all of these activities, the goal for the Aquaculture Licensing and Compliance Branch is to foster and secure a high state of industry compliance with statutory and regulatory requirements, and where appropriate, pursue necessary enforcement sanctions.

With regard to finfish escapes, the ministry places a high priority on investigating every incident. Protocols are in place to respond to and investigate suspected or known escape incidents and MAFF Inspection staff attempt to attend sites within 72 hours of discovery.

The *Aquaculture Regulation* requires that operators verbally report a suspected or known escape incident within 24 hours of discovery and all operators have been provided with an "Escape Incident Report" (see *Appendix 7*) that outlines information that must be provided in initiating an investigation. As noted earlier in the report, MAFF now has an after-hours toll-free escape reporting line to ensure that appropriate staff are notified immediately of any escape events.

While MAFF's legislative framework does not provide the authority to recapture lost fish, which is a federal DFO responsibility, the company is required to have an escape response plan which identifies efforts to control, mitigate, remedy and confine the escape incident.

Under provincial legislation, MAFF Inspectors have six months from the date of the event to investigate and, if appropriate, pursue enforcement sanctions. Investigations are considered highly confidential until concluded.

Results of investigations may lead to one of the following outcomes:

- determination that the incident (i.e., escape) or possible violation does not warrant any enforcement sanction;
- issuance of a written warning;
- issuance of one or more violation tickets;
- submission of a Report to Crown Counsel with recommended charges; or,
- recommendation to the licensing authority for Aquaculture Licence suspension or revocation.

OTHER 2001 COMPLIANCE AND ENFORCEMENT ACTIVITIES

From April 1, 2001 to January 31, 2002, Fisheries Inspectors initiated a total of 68 investigations of possible non-compliance to the (BC) *Fisheries Act* or *Aquaculture Regulation*. Statistics on investigation results follow in more detail.

2001 INVESTIGATIONS

- 35 percent of the cases pertain to alleged finfish violations including escape incidents;

- 21 percent of the cases pertain to alleged shellfish violations;

- 44 percent of the cases pertain to non-aquaculture activities such as commercial fish buying, brokers, spawn-on-kelp harvesting violations.

Current Status of 2001 Investigations:

- 38 cases are still under investigation or considered “open”;

- in 14 cases, investigations have been completed, but no further action was deemed necessary;

- in 16 cases, investigations have resulted in the issuance of a violation ticket to the company;

- one investigation resulted in a conviction through the courts. Orca Shipping Inc. was convicted through the courts for failure to take reasonable precautions to prevent an escape while transporting fish. The vessel was on route between a Stolt farm site in Lily Islets to the Englewood processing plant, both located in the Johnston Strait area. Approximately 4,500 pieces of Atlantic salmon were lost when a screened door protecting the intake in the live hold was left open. A fine of $1,000 was levied by the judge; and,

- two Reports to Crown Counsel have been submitted to Crown with recommended charges as a result of fish escape incidents.

SUMMARY

MAFF Inspection staff had for the first time detailed regulatory requirements to assess the current state of compliance and, in general, the overall rate of compliance for 2001 has improved based on a comparison of year 2000 inspection results.

There were two areas where exceptions were identified during the 2001 inspection cycle, namely possessing current and approved site specific management plans and having written net maintenance records on site.

For all identified issues of non-compliance with MAFF's regulatory framework, companies have been provided with a detailed letter outlining inspection findings and necessary remedial action. *Appendix 3* provides an example of the correspondence sent to all farm site operators outlining the results of this year's inspections.

The majority of salmon farm operators are in the process of, or have implemented, necessary actions identified during inspections. Some follow-up inspections have been completed where failure to comply with remedial instructions or within the requested timeframe has been identified. Appropriate enforcement sanctions have been applied for those companies that fail to meet necessary requirements, including the issuance of violation tickets.

A review of the current *Aquaculture Regulation* is currently under way in order to both streamline and enhance requirements, including escape prevention provisions. Government is reviewing the regulation in the context of reaching the following goals:

- maintaining the effectiveness of the escape prevention provisions;
- moving from a prescriptive approach to a more results or performance-based approach;
- encouraging industry to apply innovative methods to prevent escape incidents; and,
- while still ensuring efficient and effective inspections and investigations by government, reduce unnecessary cost burdens for industry.

A summary of the proposed changes can be found on MAFF's salmon aquaculture website, located at http://www.agf.gov.bc.ca/fisheries/salmon_aqua_policy.htm.

Based on the enhancements to MAFF's compliance program and anticipated regulatory changes, it is anticipated that next year's inspection results will find that the level of compliance will continue to improve. MAFF staff will also continue to support efforts by industry to better their management practices, by supporting initiatives such as the industry-driven Code of Practice.

SUMMARY

Opportunities to improve and harmonize compliance and enforcement activities for the salmon farming industry will be ongoing with other agencies such as DFO and MWLAP. Participation in these initiatives should increase efficiencies, reduce duplication of efforts by agencies and demonstrate a strong, integrated and accountable compliance and enforcement regime for the province.