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Norway vs. British Columbia: A Comparison of Aquaculture Regulatory Regimes

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This report is a comparison of the aquaculture regulatory regimes of British Columbia and Norway. It concentrates on five different areas: Escapes, Disease, Sea Lice, Waste, and Siting:

I. Escapes

The 1998 Norwegian regulation of fish farming requires that fish farms keep up-to-date contingency plans for limiting the size of escapes and recovering escaped fish, and that they report any escapes immediately by fax or phone. The regulation further requires that the plan include "safety precautions for the towing of sea cages and for the handling of fish during loading and unloading." An additional requirement is to set up nets within 20 meters from the fish farm in order to monitor for escaped fish. The regulation does not appear to cover the range of management practices necessary to minimize escapes. The Regulation on Operation and Diseases Regulation on fish farms required license holders to report immediately to the Directorate of Fisheries if any fish escape is suspected and to recover escaped fish. It also required turning over complete information on any escapes.

Since 2000, the Norwegian government has carried out a "national program of action against escapes" and has increased its monitoring of the industry in regard to fish escapes. This has consisted of examining the contingency plans of license holders and their record-keeping on operational routines. However, the only enforcement actions available are the coercive fines provided under the 1998 regulation for violations of its provisions. That means that the failure to have a contingency plan can result in a fine, but not a failure to establish the management practices necessary to prevent escapes. According to the government report to the Storting in 2001, the action plan against escapes called for "internal checks" that were being translated into new regulations. These checks were to take the form of an audit of the fish farm's management system, based on the ISO 14001 standard of environmental management. Thus the government would audit whether certain generic management procedures are in place. This system has not yet been adopted for monitoring and enforcement of escape prevention and escape response plans.

BC manages escapes through the *Aquaculture Regulation*. The Aquaculture Regulation specifies that each operator must create a Best Management Practices Plan that incorporates a written escape response plan.

The comparison of the two regimes is as follows:

BC	Norway
Escape Prevention	
Inspection The minister may appoint a person as an aquaculture inspector to investigate matters related to the conduct of the business of aquaculture, and compliance with the Fisheries Act, this regulation and an aquaculture licence and its conditions. (s. 12 (1) *Aquaculture Regulation (AR)*) Containment structures must be designed and constructed to meet generally accepted standards prevalent to the aquaculture industry. (s. 4 Appendix 2, AR) Servicing and inspection must be carried out by a person who knows the risks of finfish escape. **(**s. 18 Appendix 2, AR**)**	Installations: Inspection and Certification Inspections are carried out by accredited independent agencies. (s. 6 *Technical Standard Regulation* (TSR)) Marine fish farming installations and main components must obtain a product certification by an accredited certifying agency. (s. 8 TSR)

A person must not release aquatic plants or fish, or cause, authorize or allow the release of aquatic plants or fish, to fresh or tidal waters from an aquaculture facility or from a containment structure or an attachment structure in an aquaculture facility unless authorized to do this by an aquaculture licence. (**s.** 3 (1) AR) A holder must take reasonable precautions to prevent the escape of aquatic plants and fish from the holder's aquaculture facility and from a containment structure or an attachment structure in the aquaculture facility. (s. 3 (2) AR) A holder must take all reasonable measures to control, mitigate, remedy and confine the effects of an escape or a suspected escape of aquatic plants or fish from the holder's aquaculture facility. (s. 3 (3) AR) A person who transports aquatic plants or fish on, over or through fresh or tidal waters must take reasonable precautions to prevent the escape of the plants or fish. (s. **11** (1) AR) A person who transports finfish must take all reasonable measures to control, mitigate, remedy or confine the effects of an escape of finfish. (s. **11** (2) AR)	

Best Management Practices Plan**:** Holders must develop and follow a best management practices plan for the operation and maintenance of their marine finfish aquaculture facilities. **(s. 34** (1) AR) Every holder must have a written escape response plan. **(s. 35** AR)	Contingency plan The holder of a licence to breed salmon and trout in the sea must have an up-to-date contingency plan for all sites in use with a view to how future escapes can be limited and how recovery can be carried out most effectively. The contingency plan must also include safety precautions for the towing of sea cages and for the handling of fish during loading and unloading. (s. 25 *Operation and Diseases Regulation (ODR)*)
Training Holders must ensure that all finfish aquaculture facility staff are trained to conduct the business of aquaculture in a manner that prevents escapes and, if escapes occur, enables them to detect escapes and respond immediately and appropriately. **(s. 7(1)** AR) Installation Design and Maintenance All equipment, materials and structures employed at a marine finfish aquaculture facility must be designed, constructed, installed, inspected and maintained in a manner that prevents escapes, including escapes caused by damage, holes or tears to net cages or containment structures through entanglements with other equipment. (s. 2, Appendix I, AR) Holders must monitor, evaluate and maintain containment structures, including cage support systems and net cages, in order to prevent escapes and to detect and respond to any escapes in a timely manner. (s. 3, Appendix I, AR)	Maintenance The supplier of the installations and components must provide a user handbook for the installation and maintenance of the product. All installation, repair, and maintenance must be done in accordance with the handbook. (s. 9 TSR)

	Duty to monitor There is a duty to monitor the fish population outside the nets (by fishing) by 20 meters. However, owners have an opportunity to show that other methods would be as effective. (s. 25 ODR)
Records: For each finfish aquaculture facility of a holder, the holder must maintain accurate written records of the following for each containment structure in the aquaculture facility: each escape of finfish from the aquaculture facility. (s. 5(1)(e) AR) For each finfish aquaculture facility of a holder, the holder must maintain accurate written records of the details of all inspections, maintenance and evaluation of all fish handling equipment, cage support systems and containment structures, including net cages and bag cages. (s. 6(1) AR)	Records: For each calendar month, the following information shall be recorded for each licence, site and unit/sea cage: reason for escape, time of escape, number of escaped fish, their average weight and state of health. Notification to the Directorate of Fisheries' regional office and date when this was done. (s. 9 ODR)
Reacting to Escapes	
Duty to report escapes The holder, or a person acting on behalf of the holder, who discovers an escape or evidence suggesting an escape of finfish from an attachment structure or a containment structure in the holder's aquaculture facility must report the escape or evidence to the manager. (s. 4(1) AR)	Duty to report escapes Licence holders have a duty to report immediately to the Directorate of Fisheries' regional office for the district in question if fish escape or if a break out is suspected. The report shall be given immediately by fax or by telephone. A report must also be submitted on the form issued for this purpose. (s. 25 ODR)

Recapture of Escaped Fish A holder who recaptures or attempts to recapture finfish that have escaped from an aquaculture facility must report in writing the results of the recapture or attempt to recapture to the manager within one week of the recapture or attempted recapture. (s. 4(3) AR) After an escape or suspected escape, holders must ensure that immediate corrective action is taken to prevent further escapes and the escape response plan is fully executed. (s. 38, Appendix II, AR) **39** On the escape of finfish from an aquaculture facility, the holder must take all reasonable measures consistent with federal, British Columbia and local government enactments that (a) will result in the recapture of a significant portion of the lost stock, and (b) will not detrimentally impact on wild stocks. (s. 39, Appendix II, AR)	Duty to recover escaped fish It is the responsibility of holders of licences to farm salmon and trout in the sea to recover fish that have escaped from the farm. The duty to recover fish is limited to the immediate vicinity of the farm, which is defined as the sea area up to 500 metres from the farm and no longer applies when it is obvious that the escaped fish are no longer in the immediate vicinity. (s. 25 ODR) When escaped fish are found to be or suspected of suffering from an infectious disease, the Norwegian Animal Health Authority - chief county veterinary officer, in consultation with the Directorate of Fisheries' regional office and the county governor, may extend the duty to recover escaped fish. (s. 25 ODR) Both the start and finish of recovery fishing shall be reported to the Directorate of Fisheries' regional office, the fishery protection authority and the county governor. (s. 25 ODR)
	Right to recapture escaped fish The right to recapture escaped fish may be exercised for up to 14 days after escape. The gear used in the recapture and the area of the recapture can be restricted by the Ministry. (s. 9 *Aquaculture Act*)

Enforcement	
An aquaculture inspector may enter an aquaculture facility to investigate and a person must not obstruct the inspector. (s. 12(2) AR) At the request of an aquaculture inspector, a holder must produce for inspection any record or best management practice plan that is required to be kept under this regulation or as a term of an aquaculture licence. (s. 12(3) AR) MAFF Inspectors or MWLAP Conservation Officers have six months from the date of the event to investigate and, if appropriate, pursue enforcement sanctions. Investigations are considered highly confidential until concluded. (MAFF website) Results of investigations may lead to one of the following outcomes: a) determination that the incident (i.e., escape) or possible violation does not warrant any enforcement sanction; b) issuance of a written warning; c) issuance of one or more violation tickets; d) submission of a Report to Crown Counsel with recommended charges; or, e) recommendation to the licensing authority for Aquaculture Licence suspension or revocation.	Escapes are governed by the same enforcement regime as for the Aquaculture Act. (s. 19 TSR) This regime includes the use of coercive fines, the withdrawal of licences, and the possibility of criminal prosecution leading to fines or imprisonment for up to two years. (s. 22 - 25 Aquaculture Act)

II. Disease

BC, through the Ministry of Agriculture, Food and Fisheries (MAFF), addresses diseases by requiring operators to develop a Fish Health Management Plan. These plans are a "results orientated" approach to aquaculture management and, although MAFF requires the presence of certain elements, they emphasize that the elements are not prescriptive management practices but rather the fish health requirements that must be addressed. Operators are left to decide for themselves how each element is addressed. Norway approaches the issue of disease through a variety of Acts and regulations. In particular, Norway has created a Fish Disease Act, the purpose of which is to control and eradicate diseases in fish and other aquatic animals. This Act contains specific provisions relating to the duties of individual operators and outlines, explicitly, the powers that the state has to enforce those duties, including the levying of tough penalties against operators.

The following is the comparison between the two approaches:

BC	**Norway**
Disease Prevention	
Operators must: a) regularly and systematically inspect fish and fish holding units for signs of disease; b) increase monitoring efforts for groups of fish showing unusual mortality rates, signs of morbidity, or subjected to stressful events that could predispose them to disease; c) routinely evaluate fish health and other production records; and d) develop an action plan to prevent, control or treat disease.	The central provision of the Fish Disease Act is that everyone must exercise the necessary care to ensure that there is no danger of infectious diseases developing or spreading between aquatic animals (s. 1 *Fish Disease Act* (FDA)). When so requested by a public authority, everyone shall provide information which has significance for the prevention and counteraction of disease.

Dead Fish Operators must: a) regularly remove dead fish from holding units and dispose of the fish in a manner that will not facilitate the spread of disease; and b) plan for the removal and disposal of increased levels/numbers of mortalities during unexpected disease outbreaks or loss of fish. Addressing Risk Factors: Operators must have a: a) regular program for monitoring and recording water quality (i.e. temperature, oxygen, effluent); and b) contingency plan to restore water quality. Operators will: a) minimize the time fish are exposed to stressful events such as anaesthesia/sedation, crowding, and out-of-water events (i.e. handling, counting, grading, tagging, injecting); b) minimize predator interactions; c) provide fish with suitable rearing conditions and appropriate nutrition; and d) ensure equipment and methods used to handle fish will not result in significant injury or predispose fish to disease. Operators must use: a) vaccination procedures that minimize injury, secondary disease or losses to fish; and b) vaccination programs based on local disease/infection conditions and information on the safety and efficacy of vaccines.	Dead Fish Fish farms must have acceptable containers/facilities to hold dead fish and fish parts (s. 6 ODR) It is prohibited to dump dead animals or to free live animals. (s. 17 ODR) Dead or sick animals, waste originating from fish farming and used packaging shall be regarded as infectious and handled in such a way that there can be no danger of spreading disease, and also in a way approved by the Norwegian Animal Health Authority. This means, among other things, that dead or dying aquatic animals shall be removed from the production unit daily, insofar as this is possible. Dead fish shall be ground and preserved in acid and dealt with immediately in accordance with the approved handling methods. The pH value of the finished silage must not exceed 4. (s. 17 ODR) Farmed fish or parts of such fish must not be used as feed for farm fish. (s. 21 ODR)

Records Concerning Disease: For individual groups of fish in the facility, operators must: a) keep up-to-date fish health records including: - disease history and management; - pattern of morbidity and mortality, sampling and diagnosis of disease; - actions taken to prevent, control, and treat disease; - records of movements of fish within the facility; and - health risk factors specific to the site and/or the affected fish group; b) keep records, for a minimum, the entire time that the fish are being cultured (i.e. until they have been released to the wild or harvested); and c) be able to link fish health records to other production records (i.e. feed, environment, transfers).	Records Concerning Disease: (s. 9 ODR) For each calendar month, the following information must be recorded for each licence, site and unit/sea cage: number of individuals, species, origin, stocking time and average weight (live weight) number of kg of fish per cubic metre (live weight) For each calendar month, the following information is recorded for each licence and site: in the event of disease, records shall be kept of diagnoses, who made them (fish health service/veterinarian), diagnostic tests carried out (public/private laboratory), treatment/methods of treatment carried out etc.

Hygiene + Disinfection Operators must: a) reduce the potential movement of infectious or parasitic agents within and between facilities by: - using good hygiene and sanitation protocols that manage the movement and disinfection of staff, contractors, visitors, vessels or vehicles; and - routinely cleaning and disinfecting equipment and holding units; b) safely handle and dispose of disinfectants (In accordance with occupational safety waste management and pollution regulations).	Disinfecting Equipment + Personnel : (s. 13 ODR) Equipment must be disinfected before it is brought to the farm Net pens and equipment must be disinfected before being brought onto the site. Transportation of used nets must be done in a way that direct contact (or runoff) with the ocean or rivers is avoided. Workers must wear special working clothes and footwear that is not used off the farm. Disinfectant foot baths and overalls must be available at the farm or at the point of departure ashore for transport to the farm. Visitors must wear overalls and disinfect their footwear before being admitted to the farm.
	Fish Density: (s. 19 ODR) Fish density per production unit shall not exceed 25 kg/m^3. The volume of fish per licence shall not exceed 50 tonnes/1,000 m^3.
	Fallowing: (s. 20 ODR) All fish farming sites must regularly be emptied and left fallow in line with the relevant guidelines in force at all times issued by the Norwegian Animal Health Authority
	Slaughtering and bleeding It is prohibited to slaughter and bleed fish at fish farms and fish that have been slaughtered must not be returned to the farm. (s. 15 ODR)

	Licences Farm licences will not be granted if it will cause a risk of the spread of disease in fish or shellfish. (s. 5 *Aquaculture Act*)
	Siting no one may establish, expand or move aquaculture establishments without approval. (s. 7 FDA)
	Zoning The government can establish epidemiologically separate regions for which different regulations are applicable.
Reacting to Disease	
Operators must notify Provincial and Federal authorities in the event of outbreaks in accordance with existing regulations or surveillance agreements.	Duty to Notify When there is reason to believe that aquatic animals have been or are in danger of being attacked by an infectious disease, the public authorities shall be notified immediately. The obligation to give notification rests with everyone who is responsible for aquatic animals. Other persons also have an obligation to give notification unless this is obviously unnecessary. (s. 5 FDA)

Operators must: a) have access to the resources and qualified personnel needed to detect and manage a disease outbreak; b) develop a rapid response plan to reduce the spread of disease and initiate it when a disease outbreak is detected; c) detail all monitoring activities during and after an outbreak to establish the distribution of the disease and monitor the effectiveness of control and treatment measures; d) keep details of investigations and verification of all outbreaks (this must be under the supervision of a qualified fish health professional);	Escape monitoring may be ordered when farmed fish are found to be or suspected of suffering from an infectious disease. (s. 25 ODR)
	It is prohibited to sell, purchase, give away or receive live aquatic animals when they are or may be suffering from an infectious disease or if they show visible signs of illness. (s. 16 ODR)
	<u>Decontamination</u>: The Ministry may order the decontamination of facilities, transport units and equipment when infectious disease is suspected or found in aquatic animals. No compensation will be given from public funds for financial losses resulting from measures that are required to be implemented pursuant to this Act. (s. 25 FDA)

	Establishment of zones: (s. 26 FDA) When aquatic animals are or have been attacked by infectious disease, or when there is a suspicion of such a disease, the Ministry may establish zones and for each zone issue provisions: a) forbidding the catching or releasing of aquatic animals b) forbidding the transfer of live or dead aquatic animals, including animal waste and by-products, in to, out of or between such zones. c) stipulating that any measures that can be initiated to control and eradicate infectious disease for one or more aquaculture establishments or other enclosures, shall apply to the whole zone d) stipulating that measures that can be initiated to control or eradicate disease in wild stocks shall apply to the whole zone. e) initiating measures that are necessary in order to obtain or maintain free status or as a result of international agreement. § 26.
	Necessary Measures When infectious disease has been found or is suspected in aquaculture establishments, other enclosures or means of transport, the Ministry may in order to prevent the spreading of the disease issue orders to implement necessary measures, including killing and destruction, without compensation. (s. 23 FDA)

	When infectious disease has been found or is suspected in free-living aquatic animals The Ministry may decide that free-living aquatic animals are to be treated or killed when there is reason to believe that such measures will play a significant part in controlling or eradicating infectious disease in an area. (s. 24 FDA)
	Measures of this kind may be initiated without regard to the individual property owner or rightsholder. (s. 24 FDA)
	The expenses of controlling import and export of live aquatic animals, plants, fish feed and other products and objects which can act as carriers of infection may be claimed from the importer and exporter respectively. (s. 11 FDA)

Enforcement:	
To ensure that fish culture facility operators are employing good fish health practices, a written, up-to-date Fish Health Management Plan is required that outlines the actions or procedures that operators must use at a facility to meet fish health requirements. The Fish Health Management Plan is required before approval for a licence is given and, as such, is an enforceable	Penalties: (s. 30 FDA) Any person wilfully or inadvertently contravening the provisions will be punished by fines or imprisonment for up to one year. Complicity is also a punishable offence. If especially aggravating circumstances exist, imprisonment for up to two years may be applied, unless a stricter penal provision is applicable.
	Fish farm operators must assist public servants in supervising or effecting provisions in the Act. (s. 6 FDA)
	Collection: the Agency may collect the claims by deduction in pay and similar remuneration or by creating an execution lien. (s. 28 FDA)
	Agents of the state are given considerable power to effect enforcement. If it is necessary to implement the measures immediately, any person so empowered may ensure immediate implementation of the necessary measures, without being so instructed. (s. 27 FDA)

III. Sea Lice

In BC, fish farm operators must have a Fish Health Management Plan approved by MAFF. As part of this management plan, operators are required to institute a Sea Lice Monitoring Program. This program is aimed at gathering information on trends in lice levels, managing sea lice on farmed salmon, and integration of data on wild stock migration. The information will allow MAFF to develop area-specific management strategies to address the problem of sea lice.

Norway has approached the sea lice problem by implementing a "Regulation of the fight against sea lice" (2000-02-021 nr 70). The purpose of this regulation is to protect wild Atlantic salmon by controlling the incidence of sea lice at fish farms. The regulation lays out a number of minimum requirements that are enforced by the Norwegian Animal Health Authority.

The main points of these two approaches are as follows:

BC	**Norway**
Monitoring Lice Levels: **Atlantic salmon marine sites:** Sampling will be conducted once a month for all sites. Sampling intensity will be increased to once every two weeks during wild smolt out migration. **Pacific Salmon Sites**: Sampling should occur at all sites 4 times a year – once a quarter. Three pens per site should be sampled and 10 fish chosen for evaluation in each pen. Average number of adult female lice, motile lice and total number of Caligus species should be calculated for the site.	Monitoring Lice Levels: Where sea temperatures are greater than or equal to four degrees Celsius, sea cages are to be examined for sea lice every 14 days. A lice report (see Appendix) is to be delivered on the 15th of every month to local District Veterinary Officers by mail, fax, or email. (s. 4 Reg 2000-02-01 nr 70)
Action levels for management should be 3 motile lice/sample during smolt out migration and 6 for remainder of year. Action that may be required includes husbandry changes, treatment and/or harvest.	Treatment (medicamental delousing by bath or feed) is required: In period 1.11 to 1.07: when, in a single cage, there is a per fish average of 0.5 or more adult females, or 5 or more adult females and movable stages. In period 1.07 to 1.11: when, in a single cage, there is a per fish average of 2 or more adult females, or 10 or more adult females and movable stages. (s. 5 Reg 2000-02-01 nr 70)

	Where the maximum number of sea lice is exceeded, all pens should be treated on location within 14 days after documentation (s. 5 Reg 2000-02-01 nr 70).
Monitoring by MAFF MAFF will monitor 25% of active Atlantic sites per quarter during the normal sea lice monitoring activities of the farm (approximately 12-15 farms/quarter). For Pacific salmon, 6.25% of the total number of sites sampled will be audited quarterly.	Enforcement: exceeding the maximum sea lice limits can result in a fine of $326 Can per day per 10,000 fish. The authorities can also force treatment at the owner's expense, close down the location, withdraw the owner's licence, or send the offender to prison. (s. 8 Reg 2000-02-01 nr 70)
Public Reporting Reports on lice levels will be made public by BCMAFF through their website. Reports will include average sea lice numbers by species in each subzone for each year class of fish. Environmental data and other data will be included as required.	The regulation only regulates salmon lice (lepeophtheirus salmonis) and not parasitic copepods (which have become a serious problem for salmon farmers in several areas of Norway).

IV. Waste

Norwegian regulations require that each fish farm license holder operates the sites for which the license is held in "an environmentally acceptable way." But it does not establish a specific standard for environmental quality of the benthic ecosystem beneath and around the fish farm. It appears that statutory regulations do not provide a specific standard of water column or benthic ecosystem quality for which fish farms can be held accountable. The so-called MOM standard includes benthic sampling and sediment sampling twice a year on locations with bad benthic conditions and every second year on locations with good conditions. However, the system is not yet obligatory. (WWF). The main legislative tools in the Norwegian waste regulatory system are the Operations and Disease Regulation, The Aquaculture Act, and the Pollution Control Act.

BC's Finfish Aquaculture Waste Control Regulation contains provisions concerning the impact of fish farms on the benthic environment beneath aquaculture installations. It has been criticized, however, because it concentrates exclusively on hydrogen sulphide and because enforcement measures are only activated at levels of contamination that are too high to protect the biodiversity and productive capacity of the benthic environment (Report Card).

The following is a comparison of the Norwegian and BC regulations with respect to aquaculture waste. The BC regulations with respect to benthic pollution have not been included in the following comparison because an English translation of the MOM standard was not available at the time of writing and there are no other Norwegian regulations concerning this matter. One important difference between the two regimes is that in Norway, operators are required to post notice at the installation when they are medicating their fish.

BC	**Norway**
Dead Animals: Operators must: a) regularly remove dead fish from holding units and dispose of the fish in a manner that will not facilitate the spread of disease; and b) plan for the removal and disposal of increased levels/numbers of mortalities during unexpected disease outbreaks or loss of fish.	Dead Animals: Fish farm installations must have a container for the storage of dead animals. (s. 6 ODR) It is prohibited to dump dead aquatic animals or parts of such animals. Waste originating from fish farming and used packaging shall be regarded as infectious and handled in such a way that there can be no danger of spreading disease. This means, among other things, that dead or dying aquatic animals shall be removed from the production unit daily, insofar as this is possible. Dead fish shall be ground and preserved in acid and dealt with immediately in accordance with the approved handling methods. The pH value of the finished silage must not exceed 4. (s. 17 ODR)

Records Concerning Waste: (s. 8 *Aquaculture Regulation* (AR)) A holder must keep a record of a drug administered to the holder's finfish. The record must include the following information: (a) the aquaculture licence number and name of the holder; (b) the location of the aquaculture facility; (c) the species of finfish cultured and held; (d) the name of the veterinarian who prescribed any drugs; (e) a log (i) naming the drugs, (ii) specifying how the drugs were administered, (iii) specifying the treatment schedule including the date treatment commenced, (iv) specifying the date of the last treatment, and (v) specifying the name and including the signature of the person responsible for administering each treatment.	Records Concerning Waste: (s. 9 ODR) For each calendar month, the following information must be recorded for each licence, site and unit/sea cage: a) number of individuals, species, origin, stocking time and average weight (live weight) b) Fish density c) Consumption/type/brand of fish feed For each calendar month, the following information is recorded for each licence and site: a) Consumption of medicinal products - type, name, quantity, treatment period b) Consumption of chemicals - type, name, quantity, consumption period For each calendar month, information about the following shall be recorded for each licence: a) Handling and delivery of dead fish - method of handling, quantity delivered, delivery date and recipient b) Purchases of ready-made feed and fish meal - numbers of kg purchased. c) Consumption of net impregnating agents - type of chemical, name of product, quantity and consumption period.

Monitoring: (s. 9 AR) An operator must monitor the facility by (a) surveys of hard bottoms, and (b) sediment grab sampling of soft bottoms at all sampling stations in accordance with Schedule B within 30 days of peak finfish biomass for each production cycle.	Inspection: As far as possible, an aquaculture establishment shall be inspected daily, and routine checks and maintenance shall be carried out. The establishment shall be inspected immediately after bad weather. (s. 12 ODR)
	Fish Density/Volume Fish density per production unit shall not exceed 25 kg/m3. The volume of fish per licence shall not exceed 50 tonnes/1,000 m3 (s. 19 ODR).
Feed/Medication: Operators must: a) ensure staff have access to information on the drugs, chemicals and biologics that are used on site; b) ensure safe handling and storage of drugs and chemicals; c) keep records of the amounts of drugs, chemicals, biologics and medicated feeds purchased or moved into a fish culture facility and/or used during treatment; d) ensure groups of fish that are treated can be identified during treatment and subsequent withdrawal times; and e) keep records of treatment for the entire time that the fish are being cultured or until they have be released or harvested.	Feed/Medication When feeding, care shall be taken to avoid unnecessary spills of feed. (s. 22 ODR) Special care shall be exercised when using medicinal products and disinfectants at fish farms not to release these substances into the surrounding environment (s. 23 ODR). If aquaculture animals are being given medicinal products which entail a duty to withdraw them (withdrawal time), notice of this shall be posted on a sign which must be placed beside the licence number sign on the installation. The duty to post a notice applies from the commencement of medication until the expiry of the withdrawal time for the medicine that is being used (s. 23 ODR).

Licencing & Public Notification: Reasonable efforts will be made to notify affected parties and provide them with an opportunity to comment on the application. MAFF may require the applicant to provide public notice of the proposed application in a manner that is acceptable. (MAFF licencing policy) MAFF Fisheries Inspectors will ensure compliance with the *Fisheries Act, Aquaculture Regulation*, and terms and conditions of the aquaculture licence through reporting and the conducting of regular inspections and other monitoring activities as appropriate, including spot audits. A pre-operation inspection by a MAFF Fisheries Inspector will be required for any new operation. (MAFF licencing policy) Domestic Sewage: (s. 7 AR) Operators must ensure that a) the maximum daily discharge rate does not exceed 2.5 m^3/day; b) the domestic sewage is treated by (i) a septic tank designed with a retention time of not less than 2 days prior to discharge, or (ii) a device other than a septic tank with the concentration of total suspended solids in the effluent not exceeding 130 mg/L; c) the location of the sewage discharge point to the environment is at a depth no less than 15 metres below the surface of the water; d) all records related to the construction, operation and maintenance of sewage treatment and disposal works are retained for inspection by the manager or an officer.	Licencing & Public Notification: A licence will not be granted if the facility: a) will cause a risk of pollution, b) has a location which is clearly unfavorable to the surrounding environment, lawful traffic or other exploitation of the area. (s. 5 AA) A licence may be withdrawn if the facility subsequently breaches these stipulations (s. 11 AA). Anyone planning activities which may lead to significant pollution shall at an early stage of the planning process notify the pollution control authority. The pollution control authority may stipulate that the person undertake an impact analysis in order to determine the effects which the pollution will have (s. 13 PCA). That study is public (s. 14 PCA). When an impact analysis is completed, the pollution control authority shall convene a public meeting to discuss the possible polluting consequences of the activity in question. The pollution control authority may dispense with holding such a meeting if the planned activity in question will not lead to serious pollution (s. 15 PCA).

Enforcement: Making false reports or omitting entries in documents made under the Aquaculture Regulation can lead to fines of up to $100,000 per day. Contravening the substantive provisions of the Act can lead to fines of up to $200,000 per day.	Duties on Relocation/Closure In the event of the permanent relocation or closure of a farm, the licence holder has a duty to remove waste and farm equipment, including moorings and all other equipment on the sea bed. The tidying up work shall be completed within six months after relocation or closure. (s. 31 ODR)

V. Siting

The Norwegian legislation that specifically addresses siting was not available in an English translation at the time of writing. The following passage on Norway's siting criteria is from the World Wildlife Fund's 2003 Report on the impacts of salmon aquaculture:

Norwegian regulations require no minimum distance between salmon farms and salmon rivers but specify that salmon farms cannot be closer than 5 kilometers to an "important" river. Since 1989, 52 Norwegian salmon rivers and fjords have been off-limits for aquaculture development as an interim measure to protect wild salmon runs (Norwegian Ministry of Environment, 1999a). Most of the areas on which there have been restrictions on new salmon farm sites already had salmon farms prior to the establishment of the restrictions. At such farms are located in these national salmon fjords and rivers. Furthermore, the salmon farms that were already occupying sites in these fjords and rivers have no particular restrictions on their operations and are even permitted to increases their production (Norwegian Ministry of Environment, 2002). Of 21 officiallyprotected salmon rivers, 13 are free of salmon farming, whereas 8 still permit salmon farming to continue. The current policy of Norway prohibits salmon farming in many areas, and therefore meets the requirement for the highest score for this criterion.
Despite the existence of an analytical system for calculating the ecosystem carrying capacity for a given fjord, and a declaratory policy urging that such cumulative impacts be taken into account in siting decisions, there is still no statutory requirement to reject those applications for sites in areas where carrying capacity is not sufficient, and it is not in fact being widely taken into account.

Permission to operate on a particular site in Norway may also be withdrawn in the event of a material breach of the rules regarding type approval and/or if re-use after fallowing is deemed to be out of the question as a result of the environmental conditions at the site. (s. 30 OD)

BC has a 15 point siting criteria that it uses to determine whether to grant new applications for aquaculture facilities. In the following comparison, the Norwegian data are based on the WWF report and conversations with Norwegian officials. The BC data are the 15 criteria that a potential aquaculture site must exhibit:

BC	**Norway**
At least 1 km in all directions from a First Nations reserve (unless consent is received from the First Nation).	
At least 1 km from the mouth of a salmonid-bearing stream determined as significant in consultation with DFO and the province.	More protection than BC: At least 3 - 5 km from the nearest salmon river. In addition, see above WWF passage.
At least 1 km from herring spawning areas designated as having "vital", "major" or "high" importance.	Less protection:

At least 300 m from inter-tidal shellfish beds that are exposed to water flow from a salmon farm and which have regular or traditional use by First Nations, recreational, or commercial fisheries.	
At least 125 m from all other wild shellfish beds and commercial shellfish growing operations.	
An appropriate distance from areas of "sensitive fish habitat", as determined by DFO and the province.	
An appropriate distance from the areas used extensively by marine mammals, as determined by DFO and the province.	Less protection:
At least 30 m from the edge of the approach channel to a small craft harbor, federal wharf or dock.	
At least 1 km from ecological reserves smaller than 1000ha or approved proposals for ecological reserves smaller than 1000 ha.	
Not within a 1km line of sight from existing federal, provincial or regional parks or marine protected areas (or approved proposals for these).	Less protection: aquaculture is even permitted within Marine Protected Areas.
In order to not infringe on the riparian rights of an upland owner, without consent, for the term of the tenure licence.	
Not in areas that would pre-empt important Aboriginal, commercial or recreational fisheries as determined by the province in consultation with First Nations and DFO.	
Not in areas of cultural or heritage significance as determined in the *Heritage Conservation Act*.	
Consistent with approved local government bylaws for land use planning and zoning.	
At least 3 km from any existing finfish aquaculture site, or in accordance with a local area plan or Coastal Zone Management Plan.	Less protection: at least 1 km from marine farms.

Continuing Research:

In doing th research for this project, I inevitably cam across the problem of not having access to English translations of some Norwegian legislation. People reading this report or hoping to do further research in this area may want to try to find English copies of the following Acts and regulations to assist in getting a more complete picture of the Norwegian regulatory regime.

MOM standard: this is supposed to be the Norwegian standard with respect to benthic pollution and monitoring.

Siting legislation: there is legislation outlining Norwegian siting requirements. Unfortunately, I do not know the name of the regulation/act, only that it exists.

Ministry of Environment's Regulations dated 5 September 1995 relating to waste management and the Ministry of Agriculture's Regulations dated 13 July 1994 concerning the transport of animal waste and establishments which handle animal waste.

Section 4 of Regulations dated 14 June 1991 issued by the Ministry of Agriculture concerning disease-prevention measures at fish slaughterhouses, processing plants etc.

References:

Norway:

Act of 13 June No. 54 relating to Measures to Counteract Diseases in Fish and Other Aquatic Animals (*Fish Diseases Act*)

Act 13 March 1981 no 6 relating to protection against pollution and relating to waste (*Pollution Control Act*)

Act of 14 June 1985 No. 68 relating to aquaculture (*Aquaculture Act*)

Regulation concerning requirements fro the technical standards for installations which are used in fish farming activities (*Technical Standard Regulation*)

Regulation on the fight against sea lice 2000-02-01 No. 70.

Regulations relating to Establishment, Operation and Disease-Prevention Measures at Fish Farms (*Operation and Diseases Regulations*)

Norwegian Management of Sea lice - Lice control on fish farms. Powerpoint presentation by Martin Iversen, Nordland Research Institute

WWF Report on Protecting Wild Salmon from Impacts of Salmon Aquaculture: A Country-by-country Progress Report (2003).

British Columbia:

Aquaculture Regulation

Finfish Aquaculture Waste Control Regulation.

Ministry of Agriculture Forestry and Fisheries (MAFF) website:

http://www.agf.gov.bc.ca/fisheries/index.htm

Regulating Salmon Aquaculture in BC: A Report Card. Georgia Strait Alliance (2004)

Required Elements of a Fish Health Management Plan for Public and Commercial Fish Culture Facilities in British Columbia (MAFF, June 2003): http://www.agf.gov.bc.ca/fisheries/health/fhmp_Required_Elements_June-03.pdf

Sea lice monitoring program (MAFF): http://www.agf.gov.bc.ca/fisheries/health/Sealice/Sealice_Monitoring_Program.pdf

Sea lice management strategy 2004 (MAFF)

http://www.agf.gov.bc.ca/fisheries/health/Sealice/sealice_MS_2004.pdf