code of good practice

Code of good practice:
Annexes

Annexes

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Annex 1: Hazard Analysis Critical Control Points (HACCP)

Food Safety Legislation

The health benefits of consuming salmon are well documented and include being an excellent source of protein and essential fatty acids. Scottish salmon is exported globally and enjoyed by many millions of people, so food safety is critical to protect consumers of salmon and our sector.

Every country has legislation designed to protect the safety of food, with the Codex Alimentarius Commission co-ordinating research and policy to ensure that, where the detail of legislation differs, the core principles remain constant. These general requirements are:

- Undertake a risk-based approach to the management of food safety, the most common approach being based on the Hazard Analysis and Critical Control Points methodology.
- Ensuring that product contamination risks are minimised in the food processing environment.
- Having available a product specification to demonstrate that the product is lawful and consistent with compositional and food safety standards, and good manufacturing practice.
- Ensuring that suppliers to the food business are competent to produce the materials they supply, in compliance with legal requirements and while operating appropriate systems of process control.
- Maintaining a risk-based programme for product examination, testing and analysis.
- Monitoring and acting upon customer complaints.

In Scotland, the legislation which underpins food safety comprises:

1. The Food Safety Act 1990
2. The Food Hygiene (Scotland) regulations 2006
3. The Official Feed and Food Controls (Scotland) regulations 2009
4. The Food Information (Scotland) Regulations 2014
5. The Food (Scotland) Act 2015

This legislation provides a statutory basis for Food Standards Scotland's Food Law Code of Practice, which details how FSS will work with Local Authorities to implement food safety law in Scotland.

Food law in the UK is Retained EU Legislation, which was adopted unilaterally post-Brexit. Since then, there has been an element of divergence and, consequently, FSS is undertaking a review of current food law and guidance post-Brexit. This review will not conclude prior to the publication of the Code of Good Practice but its results will need to be understood and, if necessary, acted upon by producers and supply chain members in the future.

Food Safety Management Systems

Managing food safety is a process rather than an activity. Current practices are based on the requirement of businesses to understand the product they produce and distribute and have

systems in place to identify and control hazards that are significant in terms of product safety, authenticity, legality and quality.

The robust application of food safety management systems is expected by regulators, customers and consumers. It is accepted that such systems will comprise four key elements:

- Senior Management Commitment
- A Food Safety Plan (HACCP)
- A Product Safety and Quality Management System
- Prerequisite Programmes.

Senior Management Commitment

Food safety is a cross-functional responsibility that draws on the different skills and expertise within a business. Effective food safety plans are founded on the commitment of senior managers across all departments to develop business-wide policies to underpin the activities that ensure food safety. Global food safety and retailer standards demand evidence of senior management commitment to food safety, resulting in an organisational culture which holds food safety at its core and is constantly evolving and developing.

The Food Safety Plan: HACCP

HACCP (Hazard Analysis and Critical Control Points) is a food safety risk management system that provides a methodical and evidence-based approach to controlling significant food safety risks within a food business. It results in a plan and associated procedures that make sure that the food produced by the business is safe for consumers. It helps businesses to identify what can go wrong, plan to prevent that from happening and monitor practices to ensure that the system remains effective.

HACCP is the result of a collaboration between NASA, food microbiologists from the US government laboratories and the Pilsbury Corporation to ensure the microbiological safety of food on the earliest space missions. Since then, it has evolved and been adopted globally as the most effective way of controlling food safety risks. It is a systematic and science-based approach to food safety that addresses biological, chemical (including allergens) and physical hazards throughout the food chain.

The Codex Alimentarius, or Food Code, is a set of standards, guidelines and codes of practice adopted by the Codex Alimentarius Commission. The Commission is core to the joint FAO/WHO Food Standards Programme and was established in 1963. The Commission has 188 member countries and one member organisation, the European Union. There are hundreds more observers who can contribute to, but not vote upon, Codex texts.

HACCP comprises seven principles, which were last revised in 2020, with updated guidance issued in 2023:

Principle 1	Conduct a Hazard analysis and identify control measures
Principle 2	Determine the Critical Control Points (CCPs)
Principle 3	Establish validated critical limits
Principle 4	Establish a system to monitor the control of CCPs
Principle 5	Establish the corrective actions to be taken when monitoring indicates a deviation from a critical limit at a CCP has occurred
Principle 6	Validate the HACCP plan and then establish procedures for verification to confirm that the HACCP system is working as intended
Principle 7	Establish documentation concerning all procedures and records appropriate to these principles and their application.

There is a twelve-step method, or logic sequence, for the application of these HACCP principles:

Step 1	Assemble the HACCP Team
Step 2	Describe the Product
Step 3	Identify Intended Use
Step 4	Construct Flow Diagram
Step 5	On-site Confirmation of Flow Diagram
Step 6 (Principle 1)	List all potential hazards Conduct a hazard analysis to identify the **significant** hazards Consider control measures
Step 7 (Principle 2)	Determine Critical Control Points
Step 8 (Principle 3)	Establish Validated Critical Limits for each CCP
Step 9 (Principle 4)	Establish a Monitoring System for each CCP
Step 10 (Principle 5)	Establish Corrective Actions
Step 11 (Principle 6)	Validate the HACCP Plan and Establish Verification Procedures
Step 12 (Principle 7)	Establish Documentation and Record Keeping

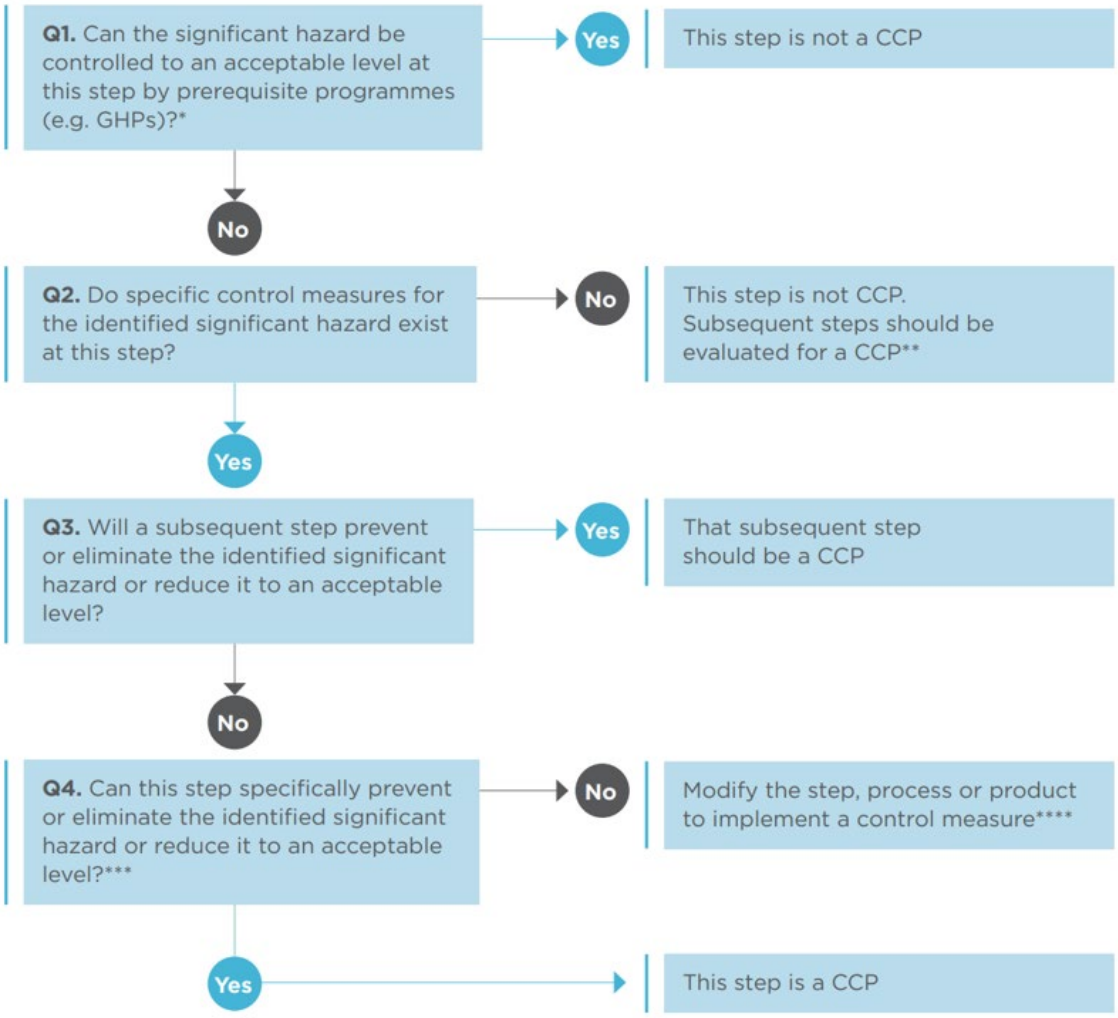
Significant Hazards

There are many potential hazards, many of which will be controlled adequately via prerequisite programmes and are therefore not 'significant'. Significance is normally assessed using a likelihood versus severity assessment model. The model used can vary, but it is important to define exactly what each variable means and what constitutes 'significant'.

In HACCP, a significant hazard always relates to food safety, not food quality or operational issues.

Once significant hazards have been identified, the use of a Decision Tree helps to identify what is, and what is not. Only those hazards which have been assessed as significant need to go through the decision tree.

In 2023, Codex updated its guidance on the implementation of HACCP to include the following decision tree. For full details see Annex IV of The General Principles of Food Hygiene (CXC 1-1969) General principles of food hygiene



Validation and Verification

Validation is a process that proves that something will work. It is objective and is performed using test methods and reference documents so that the result determines if your hypothesis was correct or incorrect. It is carried out before you implement something to prove that it will work but needs to be undertaken again if you make changes so you can prove the changes were effective. Some verification activities need to be completed at a set frequency.

Verification is a process to check that the something is working all the time. Verification can be subjective or objective and can be performed using checks, tests or reference materials. It is up to the person carrying out the verification to determine if the check is correct or incorrect. Training for staff involved in verification activities is essential and they need to understand what to do if the check shows there is a problem. All verification activities must be recorded.

Prerequisite Programmes

A HACCP system depends on Good Hygiene Practices as its foundation, together with prerequisite programmes to ensure basic standards of operational and environmental conditions are maintained. Examples of prerequisite programmes, which should be fully documented and implemented, include:

- Cleaning and disinfection
- Pest Management
- Maintenance programmes for buildings and equipment
- Personal Hygiene
- Staff training
- Supplier approval/purchasing
- Transportation
- Prevention of cross-contamination
- Allergen management

It is a requirement of UK food law, global food safety standards and retailer standards that food safety risks are controlled. Where it is possible to comply with existing law without operating a formal HACCP system, the use of the seven principles and twelve steps has become an expectation and is deemed best practice.

All members of the multi-disciplinary team who develop and maintain your HACCP system must be adequately trained in the application of the seven principles of HACCP.

The Food Safety and Quality Management System

The food safety and quality management system ensures that the HACCP system is routinely monitored, challenged and adapted to meet changes at site level, new scientific evidence, emerging threats to food safety, changes to the regulatory environment or other conditions that need to be managed to maintain food safety and quality.

Elements of the food safety and quality system include:

- The documentation of processes and procedures to ensure consistent application
- Control of documents to ensure that old versions are not in use
- Completion and maintenance of records
- Internal audits
- Supplier and raw material approval and performance management
- Specifications
- Corrective and Preventive actions
- Control of non-conforming product
- Traceability
- Complaint handling
- Management of incidents, including product withdrawal/recall

Sources of Information

HACCP is evidence-based and the resources that are used to develop and justify your decisions in relation to food safety should be held on file. Myriad resources are available from the Codex Commission, Food Standards Scotland, Local Authorities and Salmon Scotland. These should be reviewed regularly and updated as necessary to ensure that you always have access to the most up-to-date information possible.

Annex 2: Guidelines for a Veterinary Health and Welfare Plan (VHWP) and Biosecurity Plan (BP)

Introduction

A Veterinary Health and Welfare Plan (VHWP) and Biosecurity Plan (BP), which may be combined within a single document, must be prepared by each fish farming company in collaboration with its veterinary surgeon. Each VHWP must be developed specifically to cover the health and welfare requirements of individual farms or sites. The VHWP and BP are dynamic document(s) which must take account of current scientific and technical knowledge to ensure best practice and must be subject to regular review. The overview of the VHWP/BP provided in this Annex is based on the recommendations of the Fish Veterinary Society.

Aims

A VHWP/BP must cover areas of biosecurity, monitoring procedures, management and husbandry and recording/reporting procedures to accomplish the following aims:

- the prevention of introduction and spread of disease;
- the reduction and elimination of factors which predispose to disease;
- the establishment of disease prevention procedures;
- the reduction of disease incidence;
- the maintenance of an environment and systems of management and husbandry which reflect best practice in terms of maintaining fish health and welfare;
- the establishment of monitoring and reporting structures ensuring adequate fish health surveillance, early warning of any potential health or welfare problem, rapid action and follow-up.

Methods

These aims will be achieved through implementation of high standards of animal husbandry, regular veterinary visits, daily record keeping and compliance with the Code.

Responsibilities

There will be a named person in the fish farm/company who will be responsible for the overall implementation of the VHWP/BP. There will also be a named veterinary surgeon or named veterinary practice retained by the farm.

Format of VHWP/BP

A typical plan may have the following sectional structure.

Biosecurity

This section should deal with the following:

1. Health checks and certification of all incoming stocks including cleaner fish;
2. Visitor and vehicle control;
3. Sanitation and movements of personnel including third party contractors;
4. Sanitation of equipment – moveable and fixed structures and buildings;
5. Stock separation and fallowing policies;
6. Duties of person responsible for monitoring and recording biosecurity procedures;
7. Biosecurity procedures review protocol.

General Management Procedures

This should cover the principal management procedures which may have a direct impact on fish health and welfare; it should address the objective of minimising stress, damage and detrimental effects on health and welfare status of the fish:

1. Transport of fish, transfer of smolts and fish handling;
2. Stocking procedures and stocking density;
3. Routine inspection of fish, nets and equipment including recording systems;
4. Monitoring of smoltification in relevant species;
5. Water quality parameters, monitoring systems and recording procedures, emergency back-up arrangements and alarms;
6. Monitoring algae/jellyfish, prevention and contingency planning;
7. Predator control systems, procedures and licensing requirements;
8. Fish grading systems;
9. Fish crowding procedures for management purposes;
10. Slaughter, including emergency slaughter arrangements;
11. Disposal of mortalities.

Disease Control Measures

Disease control measures are aimed at prevention of disease outbreaks and minimising fish losses. Appropriate vaccination policies must be in place, based on risk assessment and the available products. Procedures must be in place to minimise the incidence of specific diseases. These procedures must be based on current knowledge of the disease and means of preventing or minimising its incidence.

This section needs to cover the following:

1. Removal and culling of sick fish from pens or tanks;
2. Removal and disposal of dead fish using legally permissible methods; diver biosecurity;
3. Emergency slaughter procedures;
4. Vaccination and prophylaxis policies, including vaccination procedures, documentation and auditing (in-house and third-party); vaccination biosecurity;
5. Use of chemicals and medicines; data sheet and COSSH information; stock control; recording usage; storage and safe handling of products;
6. Anaesthesia procedures.

Procedures for the control of specific diseases based on past history and risk assessments

These procedures must include risk assessment, prevention, identification and diagnosis, control and treatment. Examples are as follows:

1. Freshwater parasites;
2. Bacterial diseases;
3. Saprolegnia;
4. Infectious pancreatic necrosis;
5. Pancreas disease and associated pathologies;
6. Sea lice;
7. Gill disease;
8. Algae/Jellyfish;
9. Deformities.

Monitoring, recording and control

This section needs to cover the following:

1. Record keeping – health monitoring including monitoring of, for example, mortalities (separated into categories), sea lice numbers, gill disease, physical damage to fish, predation, deformities, occurrence of cataracts, vaccine responses, feeding behaviour and diver observations;
2. Occurrence of regular veterinary visits; recording observations and agreed actions;
3. Environmental monitoring (oxygen, temperature, algae/secchi, etc.);
4. Stock performance (sample weights, FCRs, feeding rates, etc.);
5. Veterinary and pathology reports;
6. On farm and company reporting structures and responsibilities relevant to the VHWP/BP;
7. Health meetings and mechanisms for VHWP/BP review, to include assessment of effectiveness of control measures in place; use of chemicals/medicines, mortality rates, incidence of specific disease;
8. Use of Animal Remedies Record Book, detailing all treatments and vaccinations undertaken;
9. Feed medicines details (brand, type, batch number, dates of use, quantity, etc.);
10. Use of Chemical Store log book.

Training

A documented training programme must be in place to include areas specifically related to the VHWP/BP. Examples of what the training programme must include are as follows:

1. Recognition of fish diseases;
2. Investigation of disease including correct sample submission and recording procedures;
3. Sea lice monitoring, recording and control procedures;
4. Safe and effective use of medicines and chemicals;
5. Fish handling;
6. Fish crowding/grading for management purposes;
7. Humane slaughter and culling of fish.

Annex 3: Risk Assessment Protocol for Fish Health

Introduction

In cases relating to fish health, the documented risk assessment should be based on the model shown in this Annex. In other cases, a simplified risk assessment covering relevant aspects of the risks and the decisions taken is sufficient (see also Annex 1).

Risk Analysis

Risk analysis is a tool to aid decision making. It provides for a documented assessment of the risks associated with an activity, which can be evaluated by others. It can provide justification for proceeding with a course of action. Alternatively, it can provide a robust defence for not conducting a particular activity. Much of the risk analysis required for compliance with the CoGP will be qualitative rather than quantitative. This means the estimated risk will be expressed in words, e.g. high, moderate or very low, as opposed to a numerical estimate of probability. Nevertheless, qualitative risk analysis is accepted as a valid and useful means of assessing risk. The quality of any risk analysis is dependent on the knowledge and expertise of the individual or team conducting the risk analysis and, as with HACCP analysis, some risk assessments will require a multidisciplinary approach. Every risk analysis contains elements that may be regarded to some extent as subjective. Therefore, transparency is essential. The following is a brief guide to risk analysis for fish health.

Step 1: Hazard Identification

In fish health terms, hazard identification normally involves identifying the pathogens that could *potentially* cause disease following the movement or importation of biological material or equipment, such as live fish or their eggs, personnel, vehicles, feed, nets or any other equipment or materials that could be contaminated with pathogens.

Step 2: Risk Assessment

The risk assessment step of risk analysis involves five components:

- release assessment;
- exposure assessment;
- probability of establishment;
- consequence assessment;
- risk estimation.

Step 2: Risk Assessment

Release assessment is the estimation of the probability (i.e. likelihood), that a hazard will be introduced as a result of the movement or importation of a biological material or equipment. In other words, it is an estimate of the probability that biological material or equipment will be infected or contaminated. Terms commonly used to qualitatively describe the probability of an event occurring are shown in Box 1 (adapted from AQIS, 1999). In making an assessment,

biological, source and item risk factors should be considered as outlined in Table 1. Each potential hazard should be dealt with separately. If the release assessment demonstrates no significant risk, the risk assessment can be terminated at that point.

Box 1: Terms used to describe the probability of an event occurring

High: Event would be expected to occur

Moderate: There is less than even chance of the event occurring

Low: Event would occur occasionally

Very Low: Event would occur rarely

Negligible: Chance of event occurring is so small it can be ignored

Table 1:

Biological Risk Factors	Source Risk Factors	Item Risk Factors
Susceptibility of the species of fish	Incidence of clinical disease	Ease of contamination
Strain of the pathogen	Prevalence of infection	Effect of processing, storage or transport
Means of transmission and infectivity of the pathogen	Geographical and environmental characteristics	Quantity of the item(s)
Impact of vaccination or treatment	Farming or husbandry practices	
	Heath certification status of the farm or country of origin of the commodity	

It may be necessary to consider risk factors for pathogens that could potentially be present on a farm, although there may be no signs of clinical disease, e.g. Infectious Salmon Anaemia (ISA) in marine farms stocking salmonid fish. Potential risk factors, including those identified for ISA by Jarp and Karlsen (1997) and Infectious Pancreatic Necrosis (IPN) by Murray *et al* (2004) on salmon farms are shown in Box 2.

Box 2: Potential risk factors for disease on marine salmon farms

Salmonid processing plant, with or without approved system for disinfection of waste water, within 5km (disinfection of waste water reduces but does not eliminate the risk).

Location of infected site within 5km (ISA) or 10 (IPN).

More than one freshwater source of smolts.

Failure to remove dead fish daily, particularly during the summer months.

Pens arranged in a concentrated cluster rather than a longitudinal chain.

Multiple generations of fish on site.

Failure to clean, disinfect and fallow pens between production cycles.

Exposure assessment (E)

Exposure assessment is the estimation of the probability that, if the disease agent is released, susceptible populations of fish would be exposed to a dose sufficient to cause infection. Biological factors, destination factors and item factors should be considered (Table 2). If the exposure assessment demonstrates no significant risk, the risk assessment can be terminated at that point.

Table 2: Examples of biological, destination and commodity factors

Biological Risk Factors	Source Risk Factors	Item Risk Factors
Susceptibility of the species of fish likely to be exposed	Presence of susceptible hosts or vectors	Whether the item is alive or dead
Strain of pathogen	Location of neighbouring farmed and wild fish populations	Intended use of the item
Infectivity and route of infection of the pathogen	Geographical and environmental characteristics	Waste disposal practices
Impact of vaccination or treatment	Farming or husbandry practices	Quantity of item

Probability of establishment (R x E)

Estimating the probability of a disease becoming established involves multiplying the results of the release and exposure assessments. Any combination of probabilities involving a Negligible stage is Negligible and any probability multiplied by a High probability is unchanged (*e.g.* Low x High = Low). Adopting a precautionary approach, any probability multiplied by a Moderate probability is also treated as unchanged. However, when two Low probabilities are multiplied,

the result is a Very Low probability and when two Very Low probabilities are multiplied the result is Negligible. A Low x Very Low combination should be treated as Negligible. Therefore, apart from the aforementioned three cases, when two probabilities are multiplied together the result is the lower of the two. This convention is illustrated in Table 3.

Table 3: Two-way table showing the product of multiplying two qualitative probabilities

		Exposure assessment (E) →				
		Negligible (N)	**Very Low (VL)**	**Low (L)**	**Moderate (M)**	**High (H)**
Release assessment (R) ↑	**High (H)**	**N**	**VL**	**L**	**M**	**H**
	Moderate (M)	**N**	**VL**	**L**	**M**	**M**
	Low (L)	**N**	**N**	**VL**	**L**	**L**
	Very Low (VL)	**N**	**N**	**N**	**VL**	**VL**
	Negligible (N)	**N**	**N**	**N**	**N**	**N**

Consequence assessment

Consequence assessment consists of identifying the nature of any adverse effect(s) on human health, animal health or the environment which may result from the movement or importation of biological material or equipment and the likelihood of these effects occurring. The consequences may be biological, environmental and/or economic. Terms used to describe the severity of the impact, or level of significance of the consequences, are given in Box 3 (adapted from AQIS, 1999). If no adverse consequences are identified, or if the likelihood of the potential consequences occurring is negligible, the risk assessment can be terminated at that point.

Box 3: Terms used to describe the significance of consequences

High: Associated with diseases that would have serious biological effects (e.g. high mortality or morbidity). Such effects would be expected to be felt for a prolonged period and would not be amenable to control measures. Such diseases would be expected to result in significant economic losses at an industry level, or they may cause serious harm to the environment.

Moderate:
Associated with diseases that have less pronounced biological effects. Such effects may harm economic performance at an enterprise/regional level. These diseases may be amenable to control measures at a significant cost, or their effects may be temporary. They may affect the environment, but such harm would not be irreversible.

Low: Associated with diseases that have mild biological effects and would normally be amenable to control measures. Such diseases would be expected to harm economic performance at an enterprise/regional level. Effects on the environment would be minor or temporary.

Negligible: Associated with diseases that have no significant or only transient biological effects. Such diseases may be readily amenable to control measures. The economic effects would be low at an enterprise level and insignificant at a regional level. Effects on the environment would be insignificant.

Table 4: Risk evaluation matrix

		Significance of Consequences →			
		Negligible (N)	**Low (L)**	**Moderate (M)**	**High (H)**
Probability of Establishment ↑	**High (H)**	**Yes**	**No**	**No**	**No**
	Moderate (M)	**Yes**	**No**	**No**	**No**
	Low (L)	**Yes**	**Yes**	**No**	**No**
	Very Low (VL)	**Yes**	**Yes**	**Yes/No**	**No**
↓	**Negligible (N)**	**Yes**	**Yes**	**Yes**	**Yes**

Yes = the risk is acceptable.

No = the risk is unacceptable and should not be taken without further risk management.

Risk estimation

The final component of the risk assessment step is risk estimation. Risk is calculated from the combination of probability and consequence. The matrix shown in Table 4 (AQIS, 1999) may be used to aid risk estimation. The risk determined is the unrestricted estimate of risk, i.e. the risk based on the absence of risk management, associated with the hazards identified. Each hazard should be considered separately in the risk evaluation. Note, when the probability of establishment is high and the significance of the consequences are high or moderate there is a clear presumption against taking the risk, but as the probability of establishment is reduced and the significance of the consequences are lower, the risk becomes acceptable.

Step 3: Risk Management

Risk management is the process of deciding upon and implementing sanitary measures to reduce the risks posed by a particular hazard associated with biological material or equipment to an acceptable level. Where there is significant uncertainty, a precautionary approach should be adopted, but there must be a rational relationship between the options chosen and the risk assessment. Sanitary measures should be monitored and reviewed, for example through inspections and random checks, to ensure they are in place and achieving the desired results.

Step 4: Risk Communication

Risk communication is the process whereby information and opinions are gathered from potentially affected parties during the risk assessment and the results of the risk assessment are communicated to the decision makers, stakeholders and interested parties. The communication of risk should be interactive, iterative and transparent. The assumptions and uncertainty in the risk estimates of the risk assessment should be communicated. Peer review of any risk analysis is an important component of risk communication for obtaining critical evaluation aimed at ensuring the data, information and assumptions are the best and most appropriate available.

The following hypothetical scenarios illustrate the hazard identification and risk assessment steps of risk analysis. They are intended as a guide and should not be regarded as comprehensive or as directions to proceed with movements under similar circumstances.

Scenario 1

Proposed activity

Movement of a wellboat used to harvest fish from one marine salmon farm (Site A) to another marine salmon farm stocking post-smolts (Site B) in a different farm management area for the purpose of grading the fish.

Hazard identification

a) What pathogens are known to be present on Site A? e.g. IPN virus.

b) What pathogens could possibly be present on Site A given the location of the farm and the health status of neighbouring farms? e.g. Suspect pancreas disease (PD) on a neighbouring

farm. No observations consistent with the presence of ISA at Site A but ISA virus is a potential hazard in the marine environment.

Release assessment (R)

Biological factors - The fish on Site A are susceptible to all the identified hazards. IPN, PD and ISA can be spread by horizontal transmission via contaminated equipment.

Source factors - The fish on Site A are known to be infected with IPN, although the prevalence of infection is unknown. The fish on Site A may be carrying PD virus. They are not suspected of infection with ISA – there are no known risk factors for ISA other than the fact that the farm is situated in marine waters. There are no clinical signs of disease at Site A.

Item factors - The hull of the wellboat has self-cleaning antifoulant paint and is free of fouling. The pipes, nets and wells of the wellboat come into direct contact with live fish and could be contaminated.

The conclusion is that the probability that IPN, PD and ISA could be released as a result of the movement of the wellboat from Site A to Site B is MODERATE, LOW and VERY LOW, respectively. Continue with the risk assessment.

Exposure assessment (E)

Biological factors - Fish at Site B are susceptible to infection with IPN, PD and ISA. IPN, PD and ISA can be spread by horizontal transmission via contaminated equipment.

Destination factors - The fish at Site B recently suffered a clinical outbreak of IPN. They are not suspected of infection with PD or ISA. None of the other farms in the farm management area, including the company's own farms operated by the same staff from the same shore base as Site B, are suspected of infection with PD or ISA.

Item factors - The wellboat will visit Site B to grade the post-smolts. It will operate close to the cages and the post-smolts will come into direct contact with the pipes, nets and wells of the wellboat.

The conclusion is that if IPN, PD or ISA was transferred to Site B via the movement of a wellboat from Site A, the probability that fish could be exposed to a dose sufficient to cause infection with IPN, PD or ISA from Site A to Site B is MODERATE. Continue with the risk assessment.

Probability of establishment (R x E)

The probability of IPN, PD or ISA becoming established at Site B as a result of the movement of a wellboat from site A would be MODERATE, LOW and VERY LOW, respectively.

Consequence assessment

The consequences of the establishment of IPN at Site B would be NEGLIGIBLE since fish on the farm are already infected. The consequences of the establishment of PD would be MODERATE. The consequences of the establishment of ISA would be HIGH.

Risk estimation

For IPN, the probability of establishment = MODERATE and the significance of the consequences = NEGLIGIBLE. Therefore, the risk is acceptable.

For PD, the probability of establishment = LOW and the significance of the consequences = MODERATE. Therefore, the risk is not acceptable and risk management measures are warranted.

For ISA, the probability of establishment = VERY LOW and the significance of the consequences = HIGH. Therefore, the risk is not acceptable and further risk management measures are warranted.

Scenario 2

Proposed activity

Movement of live salmon smolts from a farm in a freshwater loch (Site C) to a fallow marine farm (Site D) by helicopter bucket.

Hazard identification

a) What pathogens are known to be present on Site C? e.g. *Saprolegnia* and *Ichthyobodo* (*Costia*).

b) What pathogens could possibly be present on Site C given the location of the farm and the health status of neighbouring farms? e.g. Not applicable as no other farms within the same freshwater loch.

c) What pathogens could be associated with the helicopter buckets? e.g. Not applicable as buckets thoroughly cleaned and disinfected on arrival.

Release assessment (R)

Biological factors - The fish at Site C are susceptible to *Saprolegnia* and *Ichthyobodo*. Both *Saprolegnia* and *Ichthyobodo* can be spread by live fish movements and horizontal transmission via equipment.

Source factors - Clinical signs of disease due to *Saprolegnia* have been observed at Site C. The prevalence of infection with both *Saprolegnia* and *Ichthyobodo* is estimated to be high.

Item factors - The pre-smolts, transport water and helicopter buckets could be contaminated with *Saprolegnia* and *Ichthyobodo*.

The conclusion is that the probability that *Saprolegnia* and *Ichthyobodo* could be released as a result of the movement of pre-smolts from Site C to Site D is HIGH. Continue with the risk assessment.

Exposure assessment (E)

Biological factors - *Saprolegnia* and *Ichthyobodo* are unlikely to cause clinical disease in the marine environment.

Destination factors - There are no fish on Site D at present.

Item factors – the smolts are likely to recover from *Saprolegnia* and *Ichthyobodo* infection in the marine environment. There is a need to identify any potential hazards in the event that the helicopter buckets become contaminated with sea water from Site D.

Conclusion - The probability that fish at Site D will be exposed to a dose of *Saprolegnia* and *Ichthyobodo* sufficient to cause infection is NEGLIGIBLE. The risk assessment can be terminated. However, a potential risk associated with helicopter buckets returning to Site C has been identified.

Risk estimation

The risk assessment was terminated because *Saprolegnia* and *Ichthyobodo* posed a negligible threat of disease in the marine environment. However, a separate risk analysis to determine the risk associated with the movement of helicopter buckets from Site D to Site C should be carried out.

Scenario 3

Proposed activity

Movement of live salmon grower fish from a marine farm in one farm management area (Site E) to a marine farm in another farm management area (Site F), which is stocked with the same year class of fish, to facilitate the harvest of fish from Site E. Site E is located in an area that is notoriously difficult to access by wellboat in poor weather conditions.

Hazard identification

a) What pathogens are known to be present on Site E? e.g. IPN.

b) What pathogens could be present on Site E given the location of the farm and the health status of neighbouring farms? e.g. No observations consistent with the presence of ISA at Site E but ISA virus is a potential hazard in the marine environment.

c) What pathogens could be associated with the wellboat? e.g. Not applicable as wellboat thoroughly cleaned and disinfected after completion of the harvest at Site E and before arriving on Site F.

Release assessment (R)

Biological factors - The fish at Site E are susceptible to IPN and ISA. Both IPN and ISA can be spread by live fish movements.

Source factors - The fish at Site E are confirmed infected with IPN although the prevalence of infection is unknown. The fish are not suspected of infection with ISA. The cages were fallow prior to the current intake of fish, but risk factors for ISA include: the farm is situated in marine waters and other farms in the same farm management area as Site E did not fallow synchronously. There are no clinical signs of disease at Site E.

Item factors - The commodity is live grower salmon.

The conclusion is that the probability that IPN or ISA virus could be released as a result of the movement of live grower salmon from Site E to Site F is HIGH or LOW, respectively. Continue with the risk assessment.

Exposure assessment (E)

Biological factors - The fish on Site F are susceptible to IPN and ISA. IPN and ISA can be spread by live fish movements.

Destination factors - The fish on Site F are known to be infected with IPN virus. There is no suspicion of ISA at Site F or at any of the other farms in the same farm management area.

Item factors – The commodity is live grower salmon that will be released into pens at site F.

Conclusion - The probability that fish at Site F will be exposed to a dose of IPN or ISA sufficient to cause infection if the live fish from Site E are infected is HIGH.

Probability of establishment (R x E)

The probability that IPN and ISA would become established at Site F as a result of the movement of live fish from Site E is HIGH and LOW, respectively.

Consequence assessment

The consequences of the establishment of IPN at Site B would be NEGLIGIBLE since fish on the farm are already infected. The consequences of the establishment of ISA would be HIGH.

Risk estimation

For IPN, the probability of establishment = HIGH and the significance of the consequences = NEGLIGIBLE. Therefore, the risk is acceptable.

For ISA, the probability of establishment = LOW and the significance of the consequences = HIGH. Therefore, the risk is not acceptable and further risk management measures are warranted.

It may be that in some cases, particularly where the commodity to be moved or imported is live fish, there are no risk management measures available to reduce the risk to an acceptable level and the movement should not go ahead.

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Murray N, 2002, Import Risk Analysis - Animals and Animal Products, New Zealand Ministry of Agriculture and Forestry, PO Box 2526, Wellington, New Zealand.

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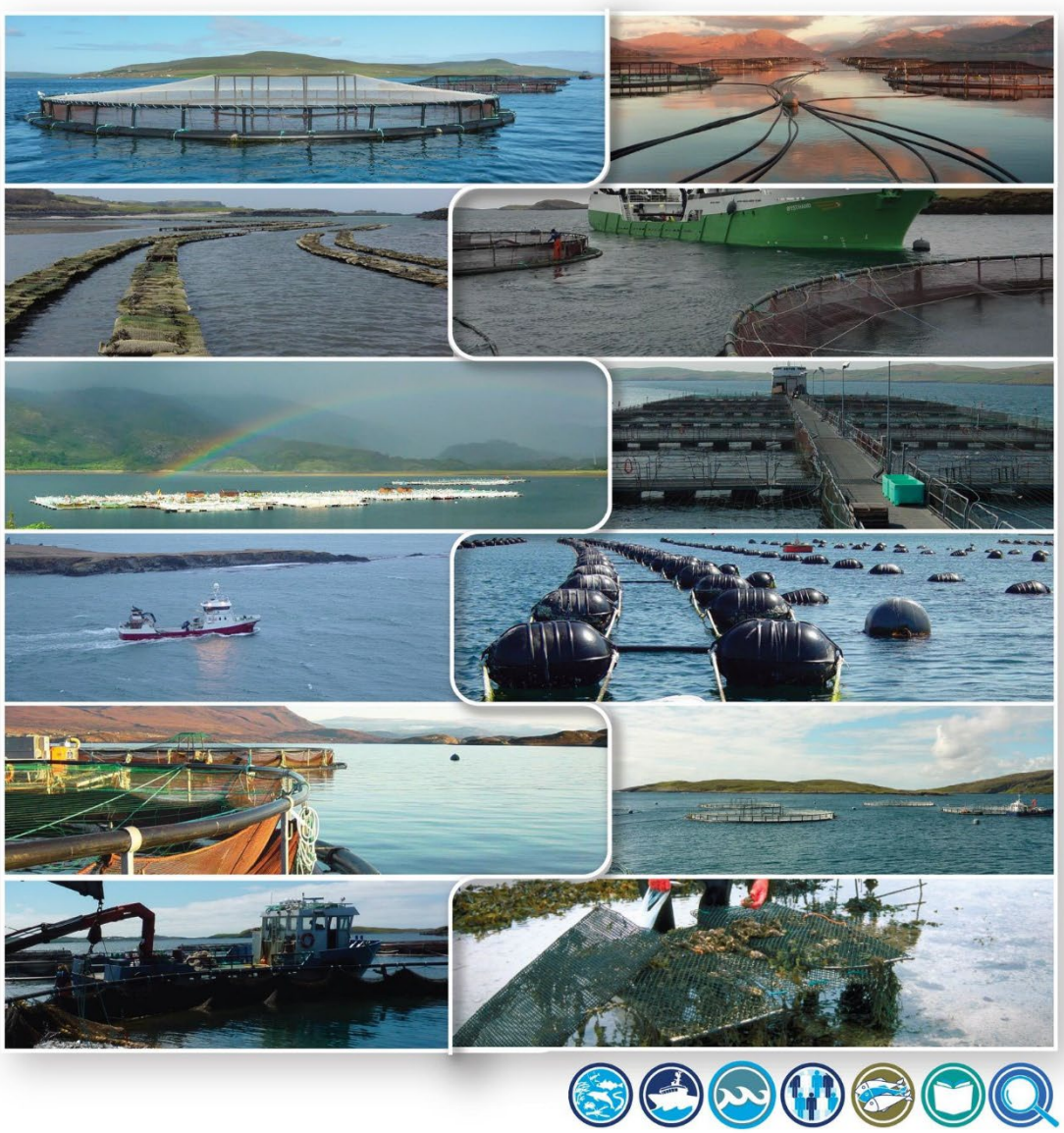
Annex 4: Disinfection Procedures

Marine Directorate

Scottish Government
Riaghaltas na h-Alba

DISINFECTION GUIDE (VERSION IV)

PRACTICAL STEPS TO PREVENT THE INTRODUCTION AND MINIMISE TRANSMISSION OF DISEASES OF FISH



The FRS Disinfection Guide (Version IV) is used and referred to by the Marine Directorate in relation to disinfection and biosecurity. The guide is currently subject to review and a revised version will be published in due course. Marine Directorate Fish Health Inspectorate, July 2025.

Fisheries Research Services Internal Report No 13/06

DISINFECTION GUIDE VERSION IV
PRACTICAL STEPS TO PREVENT THE INTRODUCTION AND MINIMISE TRANSMISSION OF DISEASES OF FISH

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January 2006

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DISINFECTION GUIDE (VERSION IV)
PRACTICAL STEPS TO PREVENT THE INTRODUCTION AND MINIMISE TRANSMISSION OF DISEASES OF FISH

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1. INTRODUCTION

Emerging diseases have had a significant impact on development of the Scottish aquaculture industry, highlighting the importance of preventing their introduction and minimising their transmission. The risk of disease spread is reduced by the implementation of good sanitary practices by fish farmers, and fisheries and the application of effluent disinfection systems in the processing industry.

To maintain healthy fish stocks and minimise the introduction and spread of disease, the aquaculture industry should ensure best practice on farm sites, during transportation of live or dead fish and equipment, at the processing plant and during subsequent effluent and waste disposal. For an assessment of the risks associated with specific tasks, reference should be made to the *Final Report of the Joint Government/ Industry Working Group on Infectious Salmon Anaemia (ISA)* available from the Fisheries Research Services (FRS) web site, at www.frs-scotland.gov.uk.

The protocols described in this guide are based upon current scientific knowledge and practical experience and will continue to be developed as the needs of industry change. This guide is intended for distribution to relevant industry personnel.

2. HEALTH & SAFETY (H&S)

Current health and safety guidelines must be followed at all times. Higher concentrations of disinfectant than necessary can be dangerous to personnel. Label instructions should be followed carefully, referring to the manufacturer's guidelines, including expiry date. Staff must be aware of the appropriate COSHH and risk assessments and must be trained before undertaking any disinfection procedure. Facilities, including operating structures, cages, tanks or vessels must be fit for purpose.

It should be noted that in rare cases some disinfectants may cause a hypersensitive reaction in susceptible individuals.

3. DISCHARGE OF DISINFECTANTS

Discharge of disinfectants to the environment is controlled under:

- The Control of Pollution Act 1974 as amended by the Water Act 1989 and the Environment Act 1995 (COPA)

and

- The Food and Environment Protection Act 1985 Part II Deposits in the Sea, as amended by the Environment Protection Act 1990 (FEPA).

COPA discharge consents are issued by the Scottish Environment Protection Agency (SEPA) and must be obtained for discharges made during activities such as net and cage disinfection at both cage sites and shore bases and for effluent disinfection at processing plants. Certain disinfectant agents, such as chlorine and iodine, should be neutralised (see section 5.9.3) before discharge. A list of SEPA addresses is given in Appendix I.

FEPA discharge consents for disposal of waste at sea are issued by Fisheries Research Services (FRS).

4. CLEANING AND DISINFECTION

4.1 Cleaning

Surfaces and equipment must be thoroughly cleaned, with detergent if necessary to remove any grease or fats, prior to disinfection as the presence of organic material during the disinfection process impairs the effect of the disinfectant. Much infectious material may be removed or inactivated at this important stage.

4.2 Disinfection

A disinfectant is an agent that deactivates infection-producing organisms. Disinfectants are usually applied to inanimate objects and are often toxic or harmful to living tissue. To ensure effective treatment, disinfectants should always be applied at the recommended concentration and temperature and for the recommended contact time. The concentration and contact time are dependent on the conditions and procedure undertaken. Organic loading (dirt) has a negative impact on the efficacy of most disinfectants. Any disinfectant which has past its expiry date should not be used.

It should be noted that good cleaning and disinfection procedures minimise the risk of disease transmission. However, disinfection is not synonymous with sterilisation.

4.3 Protocol for General Cleaning and Disinfection of Equipment

- Remove all visible organic material, using detergent if necessary to remove any grease or fats.
- Choose an appropriate disinfectant. In general, use a disinfectant which is effective against a broad spectrum of disease agents.
- Dilute the disinfectant to the recommended concentration, referring to the manufacturer's instructions.
- Apply the disinfectant to all surfaces to be treated and leave for the recommended contact time.
- Rinse with clean water, if necessary.

4.4 Choice of Disinfectant

A list of suitable disinfectants and dose rates for various applications is given in Table 1. This list is not exhaustive and will be subject to change as new information becomes available. The effective concentration of disinfectant is dependent on factors such as contact time, temperature and cleanliness of the substrate to be disinfected. It is assumed that all equipment is thoroughly cleaned and that effluent is properly filtered or pre-treated prior to the disinfection process. Certain conditions require special treatments, such as effluent from processing plants or nets, where the organic loading is very high.

TABLE 1

Disinfectants, doses and applications

Disinfectant	Example*	Dose	Application	Comments
Sodium hypochlorite	Klorsept (Jencons Scientific, UK)	100 ppm, 10 min 1000 ppm, 10 min 1000 ppm, 6 hrs	Boats, cages, tanks, hand nets, harvest equipment Processing plant effluent Cage nets	Reported effective against ISA (Torgersen, 1998 and Smail *et al.*, 2004) and IPN (Elliott & Amend, 1978) Ensure an active free chlorine level of at least 5 ppm after treatment.
Chloramine T	Halamid® (Axcentive, France)	1% (w/v), 5 min	Foot bath, non-porous surfaces	Reported effective against ISA (Smail *et al.*, 2004) (www.halamid.com)
Chlorine dioxide	Zydox AD-05 activated by DRA-2 (Zychem Technologies, Norway)	100 ppm, 5 min	Processing plant effluent	Effective against ISA (Smail *et al.*, 2004)
Iodophor	Buffodine, FAM30 (Evans Vanodine, UK) or Tegodyne (DiverseyJohnson, UK)	100 ppm, 10 min	Foot bath, clothing, diving gear, hand nets, salmonid ova, non-porous surfaces	Reported effective against ISA (Smail et al., 2004) and IPN (Elliott & Amend, 1978). Fading colour from brown to yellow indicates inadequate concentration. Not suitable for nets treated with antifoulant.
Peroxy compounds	Virkon S (Antec international, UK)	1% (w/v), 10 min (IPN) 0.5% (w/v), 30 min (ISA)	Foot baths, non-porous surfaces	Reported effective against IPN, ERM and BKD. Reported effective against ISA and furunculosis (www.antecint.co.uk).
Peracetic acid, hydrogen peroxide and acetic acid mix	Proxitane® 5 (Solvay Interox, UK)	0.4% (v/v), 5 min	Non-porous surfaces	Reported effective against ISA (Smail *et al.*, 2004).
Quarternary ammonium compounds	Cetrimide (FeF Chemicals A/S, Denmark)	125 ppm, 5 min	Plastic surfaces	Reported effective against VHS & furunculosis (Dorson & Michel, 1987). Not effective against IPN at 12,500 ppm.
Formic Acid		pH < 4, 24 hours	Ensiling fish waste	Reported effective against ISA (Torgersen, 1998). Also, effective against BKD & furunculosis but not against IPN. (Smail *et al.*, 1993)
Ozone		8 mg/l/min, 3 min (Corresponding to redox potential 600-750 mV)	Water – intake and effluent	Reported effective against IPN, furunculosis, ERM and *Vibrio anguillarum* (Liltved *et al.*, 1995). Filtration, pre-treatment is recommended.
Heat		70°C, 2 hours (IPN) 60°C, 2 minutes (ISA) 37°C, 4 days (Noda)	Cage nets, diving gear, steam cleaning non-porous surface	Reported effective against IPN (Whipple & Rohovec, 1994). Reported effective against ISA (Torgersen, 1998). Reported effective against nodavirus (Frerichs *et al.*, 2000). Heat treatment above 71°C may reduce nylon net breaking strain.
UV		122 mJ/cm^2/sec (IPN) 290 mJ/cm^2/sec (Noda)	Freshwater intake supply	Reported effective against IPN (Liltved *et al.*,1995). Reported effective against Nodavirus (Frerichs *et al.*, 2000). Efficacy compromised by organic loading. May be combined with ozone for treating effluent from processing plants.

*Inclusion of brand names is for illustrative purposes only and does not imply endorsement by Fisheries Research Services. Other products may be equally efficacious.

5. DISINFECTION PROCEDURES

5.1 Fish Farm Vessels and Ancillary Equipment

The following procedure is recommended for cleaning and disinfection of fish farm vessels, helicopter buckets, killing tables and most other fish farm equipment:

Step 1 Remove all gross fouling and organic matter by scraping and brushing.

Step 2 Clean using a detergent solution to remove particulate matter, fats and oils. Hot water may give optimum performance but check detergent manufacturer's instructions.

Step 3 Apply disinfectant at recommended concentration for appropriate contact time.

Step 4 Rinse with clean water if required.

Steps 2 and 3 may be combined as one step if a foaming detergent solution containing an appropriate disinfectant is used.

5.2 Well-boats and Feed Delivery Boats

The number of live fish transfers and feed deliveries made by boat is increasing and may involve serial deliveries to a number of sites. The risk of disease transmission by well-boats and feed delivery boats is highest where contact is made with fish or contaminated seawater. Well-boats and feed delivery boats may transmit disease via:

- Fish
- Transport water
- Bus stop deliveries
- Feed
- Personnel
- Ship structure
- Scavengers.

To minimise the risk of horizontal transmission of disease:

- Restrict access by farm staff to the vessel and from the vessel to the farm cages and other farm equipment.
- Avoid simultaneous carriage of waste and fresh feed.
- Ensure feed is processed to ensure a microbiologically safe product.
- Feed should be contained in clean containers, sealed to prevent scavenging by birds or rodents.
- Deliveries should be made to a single farm management area, to sites of the same health status or to those of highest health status first.

- The order of delivery should normally be to the youngest year class of fish first.
- Ensure appropriate vessel cleaning and disinfection procedures are followed.

Appropriate protocols for disinfection of well-boats and feed delivery vessels under different operational circumstances are given in Table 2. A risk assessment should be conducted before any operation involving the movement of vessels between sites or from a site to another location, such as a processing plant. In certain circumstances it may be necessary to employ a more rigorous stage than described in Table 2.

TABLE 2

Disinfection stages required by well-boats and feed delivery boats under different operating circumstances

Operation	Stage 1	Stage 2	Stage 3
Arriving from out with UK waters	X	X	X
Leaving a site suspected or confirmed infected with a notifiable disease	X	X	X
Leaving a Control[1] or Surveillance Zone[2] for a new operating location of greater health status	X	X	X
Leaving a Surveillance Zone on shuttle runs, to destinations of greater health status	X		
Operating between sites of equal health status within a single management area	X		
Operating on shuttle runs between sites of equal health status	X		
Leaving operations in one management area to start in a different management area	X	X	
Before and after operating on a broodstock site	X	X	
Routine anti-fouling (following company inspection)	X	X	X

[1]In coastal areas - a control zone is defined as a circle of radius equal to one tidal excursion centred on the infected farm. In inland areas - a control zone may comprise all or part of a water catchment area.

[2]In coastal areas - a surveillance zone is defined as an area surrounding the control zone of overlapping tidal excursion zones. In inland areas - a surveillance zone comprises an extended area outside the established control zone.

Stage 1 Brush/clean solids from surfaces. All pipe work, including vacuum pumps, must be cleared of fish. Pressure clean (with detergent) the following areas as appropriate:

- Deck
- Wells
- Equipment
- Protective clothing
- Pumps.

Hot water may give optimum performance but check manufacturer's instructions.

Stage 2 Complete Stage 1 then steam clean and disinfect all surfaces, including the hull down to the waterline.

Stage 3 Complete Stages 1 and 2 plus slip the vessel and clean and disinfect the hull below the waterline. While travelling to the slip, the vessel must be routed to minimise contact with any fish farm site.

Note: Stage 3 may not be necessary when leaving a Surveillance Zone if a self-polishing type of antifouling paint is used on the hull and the hull is free of fouling.

On well-boats, a disinfection checklist (Appendix III) should be kept with the ship's log. The Skipper is responsible for overseeing all procedures and must sign the checklist on completion. Copies should be retained for inspection and audit purposes.

Approval must be obtained from FRS for the movement of all items of equipment liable to transmit infection to or from sites suspected or confirmed infected with a List I or List II notifiable disease of fish. The form given in Appendix IV may be used for applications seeking approval to move equipment.

5.3 Delicate Ancillary Equipment

Electronic equipment (eg scales and thermometers) may be sprayed with alcohol and allowed to air dry, paying particular attention to manufacturer's instructions particularly in the initial removal of organic fouling.

5.4 Pallets

Plastic pallets should be disinfected according to the procedure described in Section 4.3. Wooden pallets must not be circulated between sites as the absorbent nature of wood means it is difficult to ensure successful disinfection. Pallets returned to the distribution or holding yard, together with those which may have been contaminated in transit, must be kept in a designated dirty area for disinfection or disposal.

5.5 Nets

Used nets should be transported in sealed containers. They should be tagged and logged on arrival at the designated dirty area of a net washing station to ensure they are kept separate from clean nets.

Nets should be immersed in sodium hypochlorite solution at a concentration of 1,000 mg/l for six hours (or an alternative equally effective disinfectant at the appropriate concentration) then rinsed with fresh water. The sodium hypochlorite solution must be agitated to ensure an even concentration of hypochlorite. If nets are very heavily fouled the sodium hypochlorite concentration should be increased to ensure the presence of at least 5 mg/l active free chlorine after six hours. Commercially available kits are available for measuring free chlorine concentration.

Alternatively, clean nets can be heat treated by immersion in hot water so that the entire net is subjected to a temperature of more than 65 °C for at least ten minutes.

Nets may be destroyed by incineration, disposed of in an approved landfill site or buried.

Note: Iodine based disinfectants are not suitable for use on nets treated with copper based compounds. Iodine will render the antifouling process ineffective. Heat treatment of nylon nets above 71°C can significantly affect their breaking strain.

5.6 Cages and Moorings

All removable items, including cage nets, should be cleaned and disinfected according to the appropriate procedures. As a minimum, cages, barges etc should be scraped clean, using divers if necessary, and disinfected down to and including the waterline. The rest of the structure should be left fallow for at least four weeks.

In the event that a farm is infected with a List I or List II notifiable disease, the entire cage structure may be required to be cleaned and disinfected. Cages can be moved onshore for disinfection or wrapped in a tarpaulin at sea (SEPA authorisation for discharge may be required). If the cages are to be reused on the same farm it may be permissible for the cages to be left in situ for the required fallow period following the cleaning and disinfection of the cages down to and including the waterline. The minimum fallow period in such cases is normally 3-6 months.

Sub-surface moorings can be considered as part of the seabed and, as such, they can be left to fallow *in situ*. If moorings from a site infected with a List I or List II notifiable disease are required for use on another site, and the appropriate fallowing period has not been observed, they must be cleaned and disinfected prior to transfer.

5.7 Fish Farm Staff, Divers, Diving Gear and Site Visitors

Fish diseases can be transmitted *via* equipment or personnel who come into contact with infected fish during working practices. It is important that strict hygiene procedures are followed on a daily basis. Staff and visitors, including divers, should use the protective clothing supplied on site. Divers removing dead fish from an infected site before diving on another site, without first thoroughly disinfecting their equipment, pose a serious risk with respect to disease transmission. Fish farm and diving companies should consider allowing for site-specific gear on sites suspect or infected with ISA, VHS or IHN. Dirty and disinfected suits and associated equipment should be kept separate at all times.

Staff servicing sites with the same fish farm vessel should clean and disinfect the vessel to the waterline on leaving each site. Footbaths and brushes should be strategically placed for the disinfection of equipment where this is not site-specific. The site manager should take responsibility for ensuring good practice, including the maintenance of foot baths at an effective concentration.

Diving suits and equipment should be treated as follows:

Step 1 Remove organic debris, clean with an appropriate detergent and rinse with clean water.

Step 2 Immerse in fresh water containing iodophor (minimum 100 mg/l free iodine) or an equally effective disinfectant for 20 minutes. Alternatively, heat treat by immersing equipment in clean fresh water so that the gear is maintained at a minimum of 60°C for at least two minutes.

Step 3 Rinse thoroughly with clean water.

5.8 Harvesting

Permission to move fish off sites subject to official controls for notifiable diseases must be sought from the Scottish Ministers prior to harvesting. The form given in Appendix V may be used for such applications. All movements of live fish for harvest should be recorded in the site movement records.

There is a high risk of spread of disease associated with the slaughter of farmed fish. Containment of fish and fish products, including blood, is recommended at all on-site slaughtering operations and is mandatory at sites within a Control or Surveillance Zone for a List I or List II notifiable disease. If necessary, tarpaulins should be placed beneath killing tables and any spillage collected and disinfected using sodium hypochlorite (1,000 mg/l for 10 minutes) or iodophor (1,000 ppm for 10 minutes). Care must be taken to ensure that there are no fish escapes and mortalities must be disposed of in an approved manner.

Harvest bins should be leak-proof, lined with polythene bags and have well fitting lids strapped on tightly. To prevent spillage of blood in transit the bins must not be over filled. Leaking bins or bins with broken straps or poorly fitting lids should not be used. All bins should be labelled for identification purposes and cleaned and disinfected between sites. Separate bins should be used in areas infected with a List I or List II disease.

Vehicles used to transport harvest bins should be fitted with a drainage pipe and sump to collect any spillage. In the event of spillage, the lorry bed and sump must be disinfected. Lorries should carry disinfectant and drivers should be trained in the use of the equipment and chemicals to be applied on leaving a site and in the event of spillage in transit. Contingency plans should be in place to deal with a major spillage or loss of a harvest bin in transit.

If a well-boat is used to transport fish, the valves must remain closed within 5 km or one tidal excursion (whichever is greater) of any fish farm or wild fishery. Fish must be transferred directly from the wells and not held in cages at the processing plant prior to harvest. Well water should either pass through the processing plant effluent treatment system prior to discharge or be discharged out with a tidal excursion or 5 km (whichever is greater) of any fish farm site. If

the processing plant itself is located more than two tidal excursions away from any fish farm site or significant wild fishery then the effluent may be discharged directly from the well, in the absence of blood or blood products.

5.9 Processing Plants and Ensiling

Fish blood and viscera may be particularly infectious. Therefore, strict hygiene practices must be maintained during the processing of fish and staff must be trained in observing recommended procedures. In addition, staff must be trained to recognise clinical signs of disease as fish showing clinical signs of disease are not permitted to be marketed for human consumption.

All drains should interconnect to the waste treatment plant to ensure containment of fish products and effluent discharges. Access should be restricted into the plant and between work areas.

Disinfectant foot baths and brushes must be used on entering and leaving the facility. Suitable notices must be in place at entrances restricting access and at disinfection points compelling the use of footbaths. The concentration of disinfectant should be checked and logged at least once a day and maintained at an effective level. Protective clothing should be regularly cleaned and disinfected, at least at the end of each shift, and kept on site. Plant managers may find the checklist in Appendix VI useful.

All equipment associated with the delivery of harvested salmon, mortalities, fish waste, including lorries, tubs, lids, barrels, tote bags, skips and covers, etc, must be thoroughly cleaned and disinfected. Washing and disinfection must be carried out within a designated area, ensuring that all waste is collected and disinfected before disposal.

5.9.1 Ensiling

The process of ensiling inactivates ISA virus and many other fish pathogens, such as the causative agents of bacterial kidney disease and furunculosis. Mortalities and viscera may be ensiled by a process of blending the fish to a liquefied state and mixing with formic acid. Ensiling requires a minimum of 24 hours at pH < 4.0. Logs of pH measurements should be kept and made available for inspection.

Note: Ensiling does not inactivate Infectious Pancreatic Necrosis (IPN) virus. Consequently, ensiled waste should not be regarded as free from risk with respect to disease transmission.

5.9.2 Effluent treatment

All effluent and blood water associated with fish processing should be contained and passed through an approved disinfection procedure. This is mandatory for processing of fish from ISA, VHS and IHN-infected areas and strongly recommended for all fish processing plants. Approved treatments for disinfecting blood water include sodium hypochlorite, ozone and a combination of ozone and UV radiation. All these treatments are inactivated by organic material and it is important to remove as much of this as possible, for example by filtration, before treatment.

Sodium hypochlorite must be added to ensure a residual chlorine concentration of at least 5 mg/l for more than 30 minutes. Generally, an initial concentration of 1,000 mg/l of sodium hypochlorite is sufficient. If the effluent treatment system includes a bacteriological digestion system or a high level of filtration the required concentration of hypochlorite can be reduced.

Ozone and UV treatment are only effective if particulate matter, including red blood cells, is removed prior to disinfection. This can be achieved by eg a bacteriological treatment plant or a filter capable of removing particles down to 7 µm in size. The sludge must be treated as high risk waste and ensiled by mixing with formic acid to a pH of less than 4.0 for 24 hours. Ozone must be added to give a minimum of 8 mg/l/min (equivalent to a Redox potential of 600-750 mV) for three minutes. If UV is to be used the dose must exceed 120 mJ/cm^2. It is seldom used on its own, but has proved effective in plant systems employing a combination of ozone and secondary UV treatment. There must be a logging system to monitor the dose and a back-up method must be in place in the event of failure of the disinfection system.

5.9.3 Neutralisation of sodium hypochlorite

Sodium hypochlorite should be neutralised with sodium thiosulphate prior to discharge. Five moles of thiosulphate neutralise four moles of chlorine. The molecular proportions are the same for iodine (http://www.oie.int). Care must be taken to ensure adequate mixing, eg by aeration. Treated water must be disposed of through a SEPA-approved location. SEPA will advise on the use of such agents.

5.9.4 Movement of waste

The movement of waste must be accompanied either by a waste transfer note, or consignment note if it is high risk waste (available from SEPA). This material must be disposed of at a waste management facility which is licensed to handle high risk waste.

5.10 Disinfection of Salmonid Ova

Reference should be made to current OIE guidelines for the disinfection of ova (http://www.oie.int/eng/normes/mcode/en_sommaire.htm). The following procedures are recommended to minimise the risk of extra-ovum transmission of fish pathogens from parent to progeny.

- Contamination of gametes with urine, faeces and blood should be avoided during stripping.

- Disinfection of pre-hardened eggs should take place as soon after fertilisation as possible, using buffered iodophor volume for volume in 0.9% isotonic saline solution to give a free iodine concentration of 100 ppm for 10 minutes. Thorough rinsing of disinfected, fertilised eggs should be carried out using clean isotonic saline followed by fresh water.

- Disinfection of eyed eggs should be carried out using iodophor solution to give a free iodine concentration of 100 ppm, prior to hatch or movement to another water supply.

6. DISPOSAL OF DEAD FISH

Subject to safe operating conditions, mortalities should be removed on a daily basis and should be disposed of by an approved method in accordance with Regulation (EC) 1774/2002. Local authorities have responsibility for waste disposal. A list of local authorities is provided in Appendix II.

7. PREVENT THE INTRODUCTION OF *GYRODACTYLUS SALARIS* INTO SCOTTISH WATERS

Gyrodactylus salaris is a parasite which infests the skin and fins of salmon, trout and some other types of fish in fresh water. It does not occur in UK rivers but our salmon, like those in Norway, are killed by the parasite. It is hardy and may inadvertently be introduced by fishermen, in damp conditions in bags, angling equipment and via dead fish, including bait. It reproduces very quickly, capable of starting an epidemic in a short time. Those responsible for fresh water fisheries should ensure good biosecurity measures are in place and that staff are aware of the risks.

If travelling from affected areas, ensure equipment is disinfected before fishing in UK waters.

Methods of disinfection

- Dry at 20 °C for two days
- Heat for at least 1hour at > 60 °C
- Deep freeze > 24 hours
- Immerse in disinfectant for at least 10 minutes using either:

  Virkon 1%
  Wescodyne 1%
  Sodium Chloride 3%
  Sodium Hydroxide 0.2%

Reference should be made to the leaflet "*Keep Fish Diseases Out – A guide to protecting freshwater fish stocks from gyrodactylosis and other serious fish diseases*" (http://www.frs-scotland.gov.uk/Uploads/Documents/General%20Leaflet%20very%20latest!.pdf).

8. FISHERIES

Biosecurity of a fishery is more difficult than in the farm situation. The risk of introduction and transmission of disease may be minimised by avoiding stock transfer between catchment areas, restricting the movement of personnel and equipment; developing and implementing contingency plans for disease outbreaks, prompt diagnosis of disease problems and staff training.

Moribund or dead fish and viscera (fish guts) should not be returned to ponds/the river. They should be disposed of by sealing in a polythene bag and placed in a waste bin destined for an approved landfill.

Sick or recently dead fish showing clinical signs of disease should be submitted to FRS Fish Health Inspectorate for diagnostic investigation (contact fishhealth@marlab.ac.uk or the Duty Inspector at 01224 295525). This may be co-ordinated via the local District Salmon Fishery Board or Fisheries Trust biologist, (contact www.asfb.org.uk/asfb.html).

9. DISINFECTANT APPROVAL SCHEME

Under provisions of the Animal Health Act 1981, the Department for Environment, Food and Rural Affairs (Defra) maintains a list of disinfectants that are approved for use in the control of notifiable diseases of terrestrial animals and birds. At present, this system of approval does not extend to the notifiable diseases of fish and shellfish.

Directive 98/8/EC of the European Parliament and of the Council of 16 February 1998 concerning the placing of biocidal products on the market specifies that all biocides should be demonstrably both efficacious and safe for their intended purpose before they can be marketed. Appropriate efficacy testing standards were not specified in the Directive and it will be some time before products that are currently in use are re-evaluated against the standard criteria.

Defra propose to introduce a voluntary listing system whereby companies can demonstrate to Defra that products are effective at inactivating a range of pathogens found in aquaculture. Products that pass appropriate test criteria can then be listed as being effective against the pathogens they have been tested against. This list should be useful, both to companies wishing to market disinfectants for use in aquaculture, as well as to health professionals and fish farmers wishing to select appropriate biocides.

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(http://www.frs-scotland.gov.uk/Uploads/Documents/General%20Leaflet%20very%20latest!.pdf)

APPENDIX I

SEPA Contact Addresses for Further Information

North Region
North Region HQ, Graesser House, Fodderty Way, Dingwall, IV15 9XB
Tel: 01349 862021; Fax: 01349 863987.

Fort William Area Office, Carr's Corner, Lochybridge, Fort William, PH33 6TQ
Tel: 01397 704426; Fax: 01397 705404.

Thurso Area Office, Thurso Business Park, Thurso, Caithness, KW14 7XW
Tel: 01847 894422; Fax: 01847 893365

Western Isles Area Office, 2 James Square, James Street, Stornoway, Isle of Lewis, HS1 2QN
Tel: 01851 706477; Fax: 01851 703510.

Orkney Area Office, 58A Junction Road, Kirkwall, Orkney, KW15 1AG
Tel: 01856 871080; Fax: 01856 871090

Shetland Area Office, The Esplanade, Lerwick, ZE1 0LL
Tel: 01595 696926; Fax: 01595 696946

West Region
West Region HQ, 5 Redwood Crescent, Peel Park, East Kilbride, G74 5PP
Tel: 01355 574200; Fax: 01355 264323

Argyll and Bute Area Office, 2 Smithy Lane, Lochgilphead, Argyll, PA31 8TA
Tel: 01546 602876; Fax: 01546 602337

APPENDIX II

Local Authority Contact Addresses for Further Information

Aberdeen City
Aberdeen City Council, Town House, Broad Street, Aberdeen, AB10 1FY
TEL: 01224 522000 FAX: 01224 644346

Aberdeenshire
Aberdeenshire Council, Woodhill House, Westburn Road, Aberdeen AB16 5GB
TEL: 01467 620981 FAX: 01224 665444

Angus
Angus Council, Council Headquarters, The Cross, Forfar, DD8 1BX
TEL: 01307 461460 FAX: 01307 461874

Argyll and Bute
Argyll and Bute Council Headquarters, Kilmory Castle, Lochgilphead, Argyll, PA31 8RT TEL: 01546 602127, FAX: 01546 604138

Clackmannanshire
Clackmannanshire Council, Greenfield, Alloa, FK10 2AD
TEL: 01259 452002, FAX: 01259 452230

Dumfries and Galloway
Dumfries and Galloway Council, Council Offices, English Street, Dumfries, DG1 2DD TEL: 01387 260000, FAX: 01387 260034

Dundee City
Dundee City Council, 21 City Square Dundee, DD1 3BY
TEL: 01382 434201, FAX: 01382 434996

East Ayrshire
East Ayrshire Council Council Headquarters London Road Kilmarnock KA3 7BU
TEL: 01563 576000 FAX: 01563 574062

East Dunbartonshire
Enviromental Health, East Dunbartonshire Council, Tom Johnston House, Civic Way, Kirkintilloch, Glasgow, G66 4TJ
TEL: 0141 761 4891, FAX: 0141 761 4888

East Lothian
East Lothian Council, Council Buildings, Court Street, Haddington,
East Lothian EH41 3HA,
TEL: 01620 827827, FAX: 01620 827888

East Renfrewshire
East Renfrewshire Council, Council Headquarters, Eastwood Park, Rouken Glen Road, Giffnock, East Renfrewshire, G46 6UG
Tel. no. 0141-577 3009, Fax no. 0141-577 3890

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Edinburgh, City of
City of Edinburgh Council, Council Headquarters, Wellington Court, 10 Waterloo Place, EDINBURGH, EH1 3EG
TEL: 0131 200 2000, FAX: 0131 469 3010

Eilean Siar, Comhairle nan (Previously known as Western Isles Council)
Comhairle nan Eilean Siar, Council Offices, Sandwick Road, Stornoway, Isle of Lewis, HS1 2BW
TEL: 01851 703773, FAX: 01851 705349

Falkirk
Falkirk Council, Municipal Buildings, Falkirk, FK1 5RS
TEL: 01324 506070, FAX: 01324 506071

Fife
Fife Council, Fife House, North Street, Glenrothes, Fife, KY7 5LT
TEL: 01592 413998, FAX: 01592 413990

Glasgow City
Glasgow City Council, City Chambers, George Square, Glasgow, G2 1DU
TEL: 0141 287 2000, FAX: 0141 287 5666

Highland
Highland Council, Glenurquhart Road, Inverness, IV3 5NX
TEL: 01463 702000, FAX: 01463 702111

Inverclyde
Inverclyde Council, Clyde Square, Municipal Buildings, Greenock, PA15 1LY
TEL: 01475 717101, FAX: 01475 712777

Midlothian
Midlothian Council, Midlothian House, Buccleuch Street, Dalkeith, Midlothian EH22 1DJ
TEL: 0131270 7500, FAX: 0131 271 3050

Moray
Moray Council, Council Office, High Street, Elgin, Moray, IV30 1BX
TEL: 01343 543451, FAX: 01343 540183

North Ayrshire
North Ayrshire Council, Cunninghame House, Friar's Croft, Irvine, KA12 8EE
TEL: 01294 324100, FAX: 01294 324144

North Lanarkshire
North Lanarkshire Council, Civic Centre, Motherwell, ML1 1TW
TEL: 01698 302222, FAX: 01698 275125

Orkney Islands
Orkney Islands Council, Council Offices, Kirkwall, Orkney, KW15 1NY
TEL: 01856 873535, FAX: 01856 874615

Perth & Kinross
Perth & Kinross Council, PO Box 77, 1 High Street, Perth, PH1 5PH
TEL: 01738 475000, FAX: 01738 635225

Renfrewshire
Renfrewshire Council, Council Headquarters, Cotton Street, Paisley, PA1 1WD
TEL: 0141 840 3601, FAX: 0141 840 3349

Scottish Borders
Scottish Borders Council Headquarters, Newtown St Boswells, Melrose, TD6 0SA
TEL: 01835 825055, FAX: 01835 825059

Shetland Islands
Shetland Islands Council, Town Hall, Lerwick, Shetland, ZE1 OHB
TEL: 01595 744500, FAX: 01595 744509

South Ayrshire
South Ayrshire Council, County Buildings, Wellington Square, Ayr, KA7 1DR
TEL: 01292 612170, FAX: 01292 612158

South Lanarkshire
South Lanarkshire Council, Council Offices, Almada Street, Hamilton, ML3 OAA
TEL: 01698 454444, FAX: 01698 454275

Stirling
Stirling Council, Viewforth, Stirling, FK8 2ET
TEL: 01786 443320, FAX: 01786 443474

West Dunbartonshire
West Dunbartonshire Council, Council Offices, Garshake Road, Dumbarton, G82 3PU TEL: 01389 737702, FAX: 01389 737700

West Lothian
West Lothian Council, West Lothian House, Almondvale Boulevard, Livingston, West Lothian, EH54 6QG
TEL: 01506 777141, FAX: 01506 777102

APPENDIX III

Checklist for Cleaning and Disinfection of Well-boats

Cleaning	Tick	Disinfection	Tick
Hull below waterline		Hull below waterline	
Hull above waterline		Hull above waterline	
Wells		Wells	
Grid plates		Grid plates	
Pumps (including vacuum pump)		Pumps (including vacuum pump)	
Bilge pumps		Bilge pumps	
Sea valves		Sea valves	
Deck		Deck	
Railings		Railings	
Bulkhead/casings		Bulkhead/casings	
Hatches and covers		Hatches and covers	
Derrick		Derrick	
Crane		Crane	
Ladders		Ladders	
Counting table		Counting table	
Ballast tanks		Ballast tanks	
Other equipment (specify):		Other equipment (specify):	
Water temperature used:		Disinfectant used:	
Detergent used:		Disinfectant concentration:	

I,		Skipper of the	

have overseen the Cleaning and Disinfection procedures outlined in the Disinfection Guide with regard to ISA virus (Version II).

Signed:	(Skipper)		(Witness)
Date:		Date:	

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APPENDIX IV

Application for Approval to Move Equipment

This form may be copied and used when making an application for approval to move equipment to or from site subject to official controls. Fill in the details required and fax or post to: The Duty Inspector, FRS Marine Laboratory, PO Box 101, Victoria Road, Aberdeen, AB11 9DB

Fax no: 01224 295620

For Official Use only:				
Ref no:		Inspector:		
Site name:			Site no:	FS/
Business name:				
Contact name:			Tel:	
Contact address:			Fax:	
Equipment source:				
Equipment destination:				
Proposed date of movement:				
Equipment to be moved:				
Reason for movement:				
For Official Use only:				
Approved by:			Date:	

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APPENDIX V

Application for Approval to Harvest Fish

This form may be copied and used when making an application for approval to harvest fish from a fish farm site with a Designated Area Order (DAO) or other official control notice in respect of a notifiable disease of fish. Fill in the details required and fax or post to: The Duty Inspector, FRS Marine Laboratory, PO Box 101, Victoria Road, Torry, Aberdeen, AB11 9DB

Fax no: 01224 295620.

For Official Use only:			
Ref. no:		Inspector:	
Site name:		Site no:	FS/
Business name:			
Contact name:		Tel:	
Contact address:		Fax:	
Proposed start date for harvest:			
Proposed finish date for harvest:			
Number of fish to be harvested:			
Process plant for harvested fish:			
Proposed method of transport:			
For Official Use only:			
Approved by:		Date:	

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APPENDIX VI

Check List for Processing Plants

Check	Tick
Notices restricting access posted at all entrances	
Disinfectant foot baths with brushes provided at all entrances and exits with suitable notices	
Disinfectant concentration checked and maintained at effective level	
Vehicles entering and leaving the site pass through disinfection procedure	
Transport of fish in sealed, clean and disinfected containers	
On-site vehicles, forklift trucks routinely cleaned and disinfected	
Drains connected to disinfection plant *via* filters	
Yard clean and disinfected - no blood water evident	
Foot baths in place between discrete work areas, e.g. yard, factory, chill, etc.	
Protective clothing cleaned and disinfected (at least after every shift)	
Processing equipment, utensils, etc. routinely cleaned and disinfected	
System in place to prevent wind blown effluent when emptying fish bins	
Fish-receiving hopper/tank designed to prevent spillage of fish and effluent	
System in place to prevent access to carcasses by predators, e.g. birds	
Cleaning and disinfection system in place for empty bins	
Bins from ISA High Risk Areas kept separate from other bins	
Eviscerated material pumped into ensilage system and fully contained	
Log in place to monitor pH of silage (pH <4.0)	
Filter in place to remove particulates from effluent before treatment	
Log in place to monitor effluent treatment method (e.g. residual free chlorine level in effluent >5 PPM after 30 minutes)	
pH and free chlorine logs kept for inspection by MLA	

Inspected by:		Date:	
Recommendations for improvements:	Y / N		
Specify:			

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Annex 5: Minimising Risks in Wellboat Operations

Introduction

The use of well boats for the movement of live fish and for grading and other day to day operations is an inherent part of modern salmon farming. Furthermore, wellboats may be used as a vehicle in the conduct of bath sea lice treatments where a specified biomass of fish is held in a tightly defined volume of water, thus improving flexibility of approach towards treatment.

When wellboats are used to move live fish, they create a link between fish farms and, therefore, present a hazard to be considered in risk management and biosecurity measures. The methodology under which risks associated with hazard may be assessed is outlined in Annex 3.

The guidance on minimising risk in relation to wellboat operations given here is based on the Final Report of the *Joint Government/Industry Working Group on Infectious Salmon Anaemia (ISA) in Scotland (2000)* (www.gov.scot), on the *Disinfection Guide (Version IV): Practical Steps to Prevent the Introduction and Minimise Transmission of Disease in F*ish and on additional analysis and information.

Tracking the movement and valve status of wellboats and other vessels moving fish

As of 1st January 2015, all wellboats engaged in moving live and dead fish should have the capacity to log and record their position.

As of 1st January 2015, all wellboats engaged in moving live and dead fish should have the capacity to log and record the status of their valves.

Positional information and information on valve status should be available in real time and retrospectively.

Discharge of water from wellboats and other vessels moving fish

As of 1st January 2015, all water arising from the dead-haul of fish to processing plants should be treated on-shore.

Provision should be made either for the disinfection of water used to transport live fish destined for harvesting, or the safe disposal of the water at sea (i.e. either at the site where it was extracted, or a minimum of two tidal excursions from any other site stocked with fish).

It is recommended that all water remaining after the transport of live fish to a slaughter and processing plant be filtered prior to discharge to the sea.

Info Box: Filtration may take place on-shore or onboard the vessel.

Minimising the risks

Cleaning and Disinfection

The Disinfection Guide (Annex 4) indicates that wellboats may create a potential for pathogen transmission via a number of routes and these potential routes of transmission should be minimised through the use of sound operating procedures and strict hygiene controls.

Notwithstanding, it is accepted that the greatest risks associated with the use of wellboats arise not from the vessels themselves, but from the live fish they carry and from any pathogens which may be present in these fish. Thus, if a pathogen is present, the 'Probability of Establishment' and risk of spread will increase very significantly:

- where there is any contact between fish that have been brought to a farm and those that are already there; or
- where there is any contact between fish at a farm and potentially contaminated sea water or wash water; or
- where there is any contact between equipment on the boat, or pipes linking the boat to the farm, which have been used to handle one batch of fish and are not properly cleaned and disinfected before being used to handle another batch of fish.

Cleaning and disinfection procedure for well-boats and well-boat equipment are a critical control points in risk management. Guidelines on a three-stage cleaning and disinfection regime for well boats are published in the MSS Disinfection Guide (Annex 4) and for ease of reference are reproduced in Table 1. They are based on a regime focused on the degree of risk that may be encountered under different circumstances. To be fully effective they must be robustly established and must take account of the potential points on each vessel that may harbour contamination. These may vary in detail from vessel to vessel and each vessel therefore requires a robust and 'customised' cleaning and disinfection plan which must be strictly adhered to. Farmers should seek written assurance from well-boat operators that they have an up-to-date cleaning and disinfection plan that is being followed routinely.

Table 1: Disinfection stages for wellboats under different operating scenarios.

Operation	Stage 1	Stage 2	Stage 3
Arriving in UK waters	X	X	X
Leaving a site suspected or confirmed infected with a notifiable disease	X	X	X
Leaving a Control[1] Zone or Surveillance Zone[2] for a new operating location of greater health status	X	X	X
Leaving a Surveillance Zone[2] on shuttle runs, to destinations of greater health status	X		
Operating between sites of equal status within a single management area	X		
Operating on shuttle runs between sites of equal status	X		
Leaving operations in one management area to start in a different area	X	X	
Before and after operating at a broodstock site	X	X	
Routine anti-fouling (following company inspection)	X	X	X

Notes:

1. A Control Zone is a zone established for control of notifiable diseases e.g. ISA. In coastal areas it is defined as a circle of radius equal to one tidal excursion centred on the farm that has been diagnosed as infected. In inland areas a Control Zone may comprise all or part of a water catchment area.

2. A Surveillance Zone[4] is defined as an area surrounding the Control Zone e.g. ISA. In coastal areas it is defined as an area surrounding the Control Zone of overlapping tidal excursion zones. In inland waters a Surveillance Zone comprises an extended area outside the designated Control Zone.

3. Not all farm sites necessarily will have equal status within a Surveillance Zone[5].

4. Subject to MSS approval, Stage 2 disinfection may be acceptable in the case of a vessel leaving a Surveillance Zone or a Control Zone, or a suspicious site, if a self-polishing type of anti-foulant paint is used on the hull, and the hull is foulant free.

The cleaning and disinfection regime outlined in ANNEX 9 involves the following three stages.

Stage 1 (Daily hygiene procedure when working with fish)

Brush/clean solids from all surfaces. All pipe work, including vacuum pumps, must be cleared of fish or fish waste. Pressure clean (with detergent) areas which have been in contact with fish and water with which fish have had contact:

- deck;
- wells;
- protective clothing;
- fish pumps and piping;
- all other relevant on-board equipment

Hot water cleaning may give optimum performance but check manufacturers' instructions and/or recommendations on specific items of equipment or clothing.

Stage 2

Complete Stage 1 then steam clean and disinfect all surfaces, including hull down to the water line.

Stage 3

Complete Stage 1 and Stage 2 plus slip the vessel and clean and disinfect the hull below the water line. While travelling to the slip, the vessel must be routed to minimise contact with fish farms.

Well-boat operators should complete and sign a check list of cleaning operations (see Appendix 3, Annex 4) which will indicate that cleaning and disinfection procedures have been conducted according to the appropriate schedule(s). Well-boat operators and farmers should receive a signed copy of the documentation, which should be retained at the farm site for auditing purposes.

Operating Procedures

In minimising the risks of wellboat operation there are important risk control points relating to the design and method of operation of the well-boat (closed valves for example), the standard operating procedures that are adopted by the farming company and the well-boat operator, and the way that the wellboat is deployed and used, as follows.

1. All wellboat operations should be subject to general or specific risk management assessment the degree of detail varying with the wellboat movement plan and planned use. In undertaking these assessments and in minimising risk the following points should be taken into account.

- Operations in which fish are removed from a site by well boat are of lower risk than those that involve delivery of fish to, or return of fish to, an already occupied fish pen.
- Deliveries or pick-ups of fish within a single management area limit between area risk exposure.
- Deliveries or pick-ups should be made to farms of similar health status or, alternatively, to the farm with highest health status first.

It follows that farming companies should systematically allocate a status grading to each farm within an area so well-boat operations can be optimised to minimise risk.

2. Bus stop deliveries/collections are recognised to present a risk of disease transmission and should be subject to a documented risk assessment and agreement with all other operators within the same Farm Management Area. Where a well-boat has delivered fish to or collected fish from a site already containing fish, it should not then proceed directly to another farm without appropriate procedures to manage the risk.

3. Wellboats must travel closed (i.e. with no water exchange) when located within 5km of any finfish farm site.

4. Ballast water must not be discharged within 5km or one tidal excursion (whichever is greater) of a farm site. This means that ballasting and pump cleaning need to be part of a vessel's passage plan, and are sequential operations.

5. Procedures at farms should be designed to minimise risk of disease spread.
   - Access by farm personnel to the well-boat and by the well-boat personnel to the farm and farm equipment should be restricted.
   - Equipment should not be shared between well-boat and farm operations.

6. Compliance with the above procedures should be audited by the receiving farm-site management using the well-boat movement records, the disinfection logs and the corresponding fish movement records as a basis for their assessment of risk.

Annex 6: National Strategy for Sea Lice Control & Integrated Fish Health Management

National Treatment Strategy for the Control of Sea Lice on Scottish Salmon Farms (NTS)

1. Background & History

The original 1998 NTS was developed following a technical seminar of the Scottish Salmon Growers Association (now Salmon Scotland), at which, sector scientists reported on research surrounding the survival and viability of the salmon louse. This research demonstrated that the reproductive capacity of female lice is compromised in the spring, resulting in reduced survival in their offspring. This offered opportunities for a strategic approach to sea lice control via a coordinated late winter treatment. The National Treatment Strategy for the Control of Sea Lice on Scottish Salmon Farms was established and, through this, the formation of farm management areas, agreement on suggested treatment criteria and strategic coordinated treatments within such areas.

2. Evolution of the NTS

The original 1998 Strategy was based exclusively on the use of bath treatments (as the only available option), with their accepted limitations in terms of the life stages targeted and the absence of prolonged efficacy. However, over the years the strategy evolved, to include changes in our understanding of Integrated Sea Lice Management, good farming practice, the availability of different treatment and intervention options to control sea lice, our understanding of managing and limiting opportunities for resistance to develop, recognition of non-therapeutic approaches, and our understanding of lice population dynamics.

Principles of the NTS are core to today's integrated approach to sea lice and fish health management. However, the strategy adopted today is more detailed and wide ranging, as described in the section entitled "Integrated fish health management" below.

3. Principles of the original NTS

The following principles were core to the original NTS, and remain relevant today:

- ***Defining Farm Management Areas (FMA)*** within which farming operations can be coordinated, where appropriate, to support sea lice management. Current FMAs are provided in this CoGP.
- ***Identifying salmon farmers within areas and obtaining written commitments to observe the provisions of the NTS.*** In practice, this has occurred through the development of Farm Management Agreements (FMAg) as defined within this CoGP and, since 2013, within the Aquaculture and Fisheries (Scotland) Act 2013.
- ***Forming a farm management group*** within each area, to agree the basis for monitoring lice on farms, to share information, to consider treatment options, and to support the coordination of activities including stocking and treatments. In short, this group has responsibility for carrying out the commitments of the FMAg.

- ***Agreeing the monitoring protocol and frequency of monitoring.*** From early in the development of the NTS it was agreed that lice numbers should be counted at weekly intervals on all farms, according to scientific and statistical advice (as per *Sampling Strategies for Estimating Sea Lice Levels on Farmed Atlantic Salmon: Fryer, Revie & Gettinby*, personal communication). The suggested monitoring protocol is provided under the heading "*Lice monitoring protocol*", below.
- ***Agreeing the timing and criteria for strategic treatments.*** Following research presented at the 1997 technical seminar, a coordinated treatment strategy was developed to occur, for certain populations of fish, between week 8 and 10.

  Outside this coordinated treatment, the NTS proposed that treatments should be guided by the build-up of pre-adults, the objective being to prevent the development of gravid females. The NTS proposed suggested criteria to aid farmers in their decision making around when treatments might be needed. The primary focus of the strategy was around *Lepeophtheirus salmonis*. The suggested criteria were:

  - During the period 1st February to 30th June inclusive, the criterion for treatment is an average of 0.5 adult female *L. salmonis* per fish.
  - During the period 1st July to 31st January inclusive, the criterion for treatment is an average of 1.0 adult female *L. salmonis* per fish.

  Treatment for episodic *C. elongatus* infestations was to be applied, as appropriate, to protect the welfare of farmed fish.
- ***Carrying out treatments*** promptly, according to principles that maximise their effectiveness, and which promote minimal use of medicines consistent with high standards of fish welfare and helping to preserve efficacy.
- ***Performance review and benchmarking***, with annual review meetings convened by Farm Management Groups to evaluate farm and area performance. Auditing compliance with the provisions of the NTS was to be carried out by independent UKAS-accredited inspection bodies as part of the audit process for the CoGP.

4. Lice Monitoring Protocol

The NTS defined minimum criteria for the counting and monitoring of lice populations on salmon farms (*Sampling Strategies for Estimating Sea Lice Levels on Farmed Atlantic Salmon: Fryer, Revie & Gettinby*, personal communication):

- Weekly monitoring throughout the year.
- Pens and fish sampled at random.
- Personnel carrying out lice counts should be appropriately trained.
- Where there are more than five pens on a farm, five fish should be sampled from each of five pens, to give a total of 25 fish.
- Where a farm has less than five stocked pens, all pens should be sampled to give a total of 25 fish, with a similar number of fish per pen.
- Fish should be anaesthetised prior to lice counting.
- Each life cycle stage of *Lepeophtheirus salmonis* should be counted. As a minimum this should include - adult females (gravid and non-gravid), mobiles, chalimus. All

identifiable stages of *Caligus elongatus* should be grouped together.

- Following the count, the tub containing anaesthetic should be examined for sea lice and any identified added to the pen total.
- The name of the person carrying out the count, the date, pen number and water temperature should be recorded.
- Alternative sampling regimes are considered acceptable provided they a) produce good estimates of lice numbers on fish on farms; and b) the results are periodically benchmarked against data collected using the suggested protocol set above.
- Results should be communicated to other farmers within the defined area and adjacent areas, as appropriate.

Integrated Fish Health Management

The NTS has evolved considerably since 1998, but its key principles still underpin salmonid farmers' approach to fish health management.

Salmonid farmers operate an integrated approach to fish health management (IFHM) which covers not only sea lice, but fish health and welfare more widely. Key aspects of this approach and its application on farms are covered within the Farm's Veterinary Health and Welfare Plan (VHWP), which forms a requirement of this COGP.

IFHM is a flexible and dynamic approach. At its most fundamental level, it requires access to as many different health management "tools" (approaches, strategies and interventions) as possible, which each have a role to play in supporting fish health management. However, when used together, the overall benefit to fish health can be amplified. IFHM does not require farmers to use all "tools" on all farms, in all situations, but instead promotes tailored approaches for each farm and farm management area, based on local conditions.

IFHM focuses on prevention over cure, with access to a range of strategies that seek to prevent fish from coming into contact with health challenges, but with tools available to intervene if fish health is compromised. A hierarchical approach may be adopted to include:

- Stocking strategies
- Prevention
- Technology
- Approved medicines

Critically, IFHM must be underpinned by robust monitoring / diagnostic data, information sharing and research and innovation.

Examples for the different management tools that are available to farmers and fish health professionals are provided below, alongside a brief summary of monitoring and information sharing. This summary does not include all options and components of IFHM, and it is important to note that farmers, supply chain businesses and the research community are continually seeking to expand the range of management tools available to the salmonid farming sector.

Stocking Strategies Include:

Co-ordination of stocking, where farms, and typically entire Farm Management Areas stock

just a single year class or generation of fish. This prevents opportunities for the transfer of pathogens and lice between generations of fish

Fallowing strategies, where farms are fallowed (or left empty) at the end of a production cycle. This helps to break the life cycle of pathogens and sea lice, preventing their transfer between successive generations of fish on a farm. A minimum fallow period of four weeks is a requirement of this CoGP. Alongside farm fallows, salmonid farmers also synchronously fallow entire Farm Management Areas to further optimise fish health.

Stocking with larger smolts. Increasingly, production strategies are directed towards stocking marine farms with larger smolts. This reduces the overall time that salmonids are grown within the sea, reducing opportunities for them to come into contact with harmful organisms.

Genetics. There is continual development work undertaken by broodstock and egg suppliers, to provide genetically robust strains of fish for ongrowing. Current breeding programmes use the most up-to-date approaches to identify and select stocks with genetic traits that improve the health and welfare of farmed salmonids. There are now a range of commercially available strains that have increased resistance to key health challenges.

Prevention strategies include:

Vaccination: Vaccines for farmed salmonids were first developed in the mid 1990's, and their use has since become the norm. Fish are vaccinated against a range of significant bacterial and viral pathogens of salmonids, and there is continual development of both existing and new candidate vaccines by pharmaceutical companies. Where commercial vaccines are not available, vets have the option to consider the use of autogenous vaccines, to further support the health of fish under their care.

Cleanerfish: Salmon farming is unique as a livestock sector in its use of biological control. Up to five species of wrasse and the lumpfish, are used to manage levels of sea lice on farmed salmon. A combination of farm-reared and wild caught cleanerfish are used. All cleanerfish are considered "aquaculture" fish once deployed on a farm. Cleanerfish must be cared for, including with dedicated feeding, health and welfare assessments, and appropriate pen infrastructure to support their biology.

Barriers: Physical barriers, such as lice skirts and bubble curtains, can be used to prevent harmful organisms (sea lice, jellyfish) gaining access to fish in the pens.

Nutrition: Significant advancements is farmed fish nutrition, and the development of functional feeds, have led to tailored diets that provide specific health benefits to fish. These feeds can be used to improve immune function to prevent fish from coming unwell, but can also be used to support fish in their recovery from health challenge.

Technology includes:

Freshwater: Salmon (but also some trout) are anadromous fish, living as juveniles in fresh water, before migrating to the sea as adults. This ability to live in both fresh and marine waters provides the opportunity to use freshwater to help manage specific health issues, such as sea lice and certain gill health challenges, which are intolerant to freshwater. Freshwater bathing of farmed salmonids typically occurs in wellboats, including with specialist vessels that can produce freshwater from sea water, through reverse osmosis.

Physical lice removal: a number of technologies have been developed that can gently dislodge sea lice from farmed salmonids. These use either gentle water jets or slightly elevated water

temperatures. Dislodged lice are filtered from the water before it is returned to the sea.

Approved medicines:

Medicines are an important part of any health care system, including within livestock farming, pet care, and for human health care.

Fish vets and salmonid farmers have access to a very limited suite of licenced veterinary medicines to help them manage the health of their fish. These are used prudently, observing best practice principles that were first developed with the NTS and which focus on ensuring that medicines remain effective for use into the future. Currently, salmon farmers have access to a selection of in-feed and topical (bath) treatments against sea lice, as well as a small selection of licenced medicines to treat bacterial infections. The licencing, use and discharge of medicines is under strict regulatory control.

Monitoring and information sharing:

Monitoring: Protocols for monitoring the health and welfare of farmed fish were fundamental to the NTS and these protocols have since been expanded and built upon. Farmers are legally required to assess levels of sea lice on their fish at weekly intervals (although may chose to assess their fish more regularly, particularly in summer months). At this time, sampled fish are also assessed for an increasing range of other health and welfare measures, including gill, eye and fin health, general body condition, and the presence of any damage or lesions.

Periodically, blood and/or other tissue samples may be taken from a selection of fish for more detailed diagnostic tests, such as blood biochemistry, PCR assessment or tissue histology. Samples may be taken as part of a routine screening programme but may also be used in response to, and to better understand, a specific or suspected health issue.

Companies maintain extensive databases of fish health data relating to individual populations of fish. This not only supports ongoing fish health management of the fish on the respective farm, but allows end of cycle reviews to be undertaken, which support the development of fish health and welfare management plans for future generations of farmed fish.

Information sharing: The sharing of fish health and welfare information has been central to the Code since its inception. Data and information are shared within a company, as well as across companies operating within a Farm Management Area (and as informed by the FMAg). Information sharing is accepted as a critical part of Integrated Fish Health Management, supporting farmers to improve the health and welfare of both current and future populations of fish.

Information sharing is further supported through sector trade bodies, where dedicated fish health and veterinary working groups regularly meet to share experiences, data and best practice.

Annex 7: Procedures and Standards for Holding Facilities

Design and Construction

Pens, including all ancillary and swim-though pens, should be designed and constructed so as to be capable of dealing with the weather and other environmental conditions likely to be experienced at the specific farm site. They should be selected with a sufficient safety margin to allow for year-to-year variations in weather patterns. Farmers should obtain from the manufacturers or other suitable qualified persons full information on the installation; on the important design features and the suitability of design for the planned mounting of additional equipment; on the materials used in construction; and on the strength of the design and its suitability for the environment in which it is to be deployed.

Guide to Minimum Net Strengths

The Containment Working Group that advised the development of the 1st Edition of the Code provided guidance on the minimum net strengths that should be adopted in relation to mesh size. This guidance is shown in the table below. Since that time, a variety of new materials have been introduced for the manufacture of nets. In these cases farmers should seek detailed specifications on net strengths from the suppliers and seek, with the aid of expert advice where necessary, to ensure that the net strengths will be fully adequate for the intended purpose and location, allowing a sufficient safety margin.

Mesh Size (mm)	Minimum Breaking Strength (kg/m)
6	15
8	20
10	24
15	36
25	60

NB.

For 15mm mesh net: 1000mm/15mm = 66.66 meshes/m

Full 'new' strength set at 4000kg: 4000/66.66 = 60kg/m new net

Minimum 60% full strength required at any time = 36kg/m

Anti-Predator Measures

A variety of predators have been known to attack farmed fish, but incidences of attack are comparatively low and highly unpredictable; they differ between farms at any given time and at a given farm may fluctuate widely from year to year. Farms that have not experienced a predator attack for a long period cannot take the view that they are safe from an attack occurring.

It is important in designing fish farming facilities to take a precautionary approach to the hazard of predator attack, to plan the location and the design of the facility accordingly and to use local knowledge, observation at the farm and good record keeping as a basis for developing a risk assessment. Facility designs and netting systems should be adjusted accordingly. An active approach to address any emergent issues of predator control is required.

There is no universal solution to avoiding the risk of predator attack. In practice, based on industry surveys, the most effective facilities-based measures to manage risks vary from farm to farm. There are also continuous developments in pen design, net materials and deterrent technology, which create an ever-changing situation. The adoption of anti-predator measures may also be the subject of planning or other consenting controls.

Against this background, it is important to continuously review the available approaches and technologies and, where appropriate, to change and up-date those in use. This should especially be considered when any substantial change or refurbishment of facilities is proposed or where there is any indication that the approaches being adopted are not proving effective.

Top Nets

Surface feeding predators, such as diving birds, may take fish from or near the surface of the water and are often more attracted to smaller fish, such as table trout or salmon smolts. The risk of loss or damage to fish can be reduced in these cases by use of a top net on the holding facility. Depending on the facility design such nets may be flat top nets (mounted at the level of the pen guard rail) or raised top nets, which at the extreme may provide a walk-under cover in some facilities.

In all instances it is important that the pen structure allows the net to be appropriately tensioned, with a suitable mesh size. For some birds, such as gannets, coloured nets which are more visible are sometimes recommended for conservation reasons in areas with a high sea bird population. However, in other parts of Scotland coloured nets raise objections on the basis of a perceived visible intrusion in landscape assessments. Thus farmers should seek local clarification from NatureScot when planning a new farm facility or undertaking replacement of top nets.

Other Measures

A variety of anti-predator measures are adopted on marine farm sites; they vary in design and are sometimes customised to the conditions that apply at a particular site. Because of the variability of instances in predator attack and the importance of local conditions, it is difficult to generalise about which options will be most effective at a given site. The options available will also be conditioned by the shapes and types of the fish holding pens in use.

The measures used can be considered under six main headings.

- **Pen net tensioning**
  Tensioning the pen nets with heavy weights significantly increases the protection of stock and is widely used in modern 'Polar Circle' systems. As an example, 25mm mesh netting may be used for the main body of the pen with the lower section consisting of two layers of 15 mm netting. The whole of the netting is kept under tension by cables attached to tensioning weights or rings and mooring weights.

- **Cone nets**
  These are cone shaped nets that minimise the bottom area of the fish pen, which is a prime area for attacks by seals. They also provide protection from diving birds. They can be very effective on sites where the water depth is >30m and allows the deployment of the net and mooring system.

- **False bottom cages**
  These are arrangements whereby the fish pens are modified to have a false bottom so that a 2m deep box of predator netting is positioned below the normal pen net, and is weighted at the sides and middle so that the box-net is appropriately tensioned.

- **Curtain Nets**
  These nets are 'draped' curtain-like around the fish pens to a suggested additional depth of 10m. The nets are easy to deploy and are effective in preventing predator attack from the side but not from below. Additionally, they create a possibility that deep diving birds and marine mammals can become entangled.

- **Box nets**
  Box nets, which are arranged to completely enclose either a single pen or number of pens – and can be fitted with a false bottom structure - are considered to be more effective than curtain nets as they offer protection from the sides and below. However, they create a major barrier to water flow through the fish pens and can only be deployed in areas where there are strong currents.

Screens and Barriers

In a variety of situations, for both marine and freshwater farms, predator screens may reduce the predator awareness (e.g. canvas seal blinds covering mortality baskets, covers on feed bins) and predator risk. Likewise, physical barriers on easy access points, such as walkways, or the use of electric fences (e.g. to deter otters near to sites) can be helpful. It is important that the potential need to adopt such measures is considered at the farm-planning stage, so that later adoption is not prevented by earlier decisions.

Annex 8: Relevant Legislation

Some Relevant Food and Feed Legislation

The legal requirements that apply to the operation of aquaculture establishments and vessels cover basic issues of food safety, most of which meet requirements set by the European Union and related Scottish regulations. It is the interpretation of these regulations and procedures of best practice which are reflected in this CoGP. Some main components of the relevant food and feed regulations are outlined below.

Food Legislation

The legal requirements that apply to the operation of aquaculture establishments and vessels cover basic issues

The Food Safety Act, 1990 is the central Act of Food Safety. It establishes the essential principles of food safety, gives powers to the competent authorities to enforce food safety and provides a means of enacting subsidiary Regulations on more detailed aspects of food safety. All persons in the food industry, including farmers, are subject to the Food Safety Act 1990. This Act establishes the basic requirement not to supply food that is considered unsafe, as defined by the Act.

EC Regulation No. 178/2002 on the General Principles of Food Law came into force on the 1st January 2005. This is enforced by the Food Safety Act 1990 (amendment) Regulations 2004 and the General Food Regulations 2004 which introduce requirements for food traceability and product recall.

EC Regulation No.852/2004 on the Hygiene of Foodstuffs came into force on 1 January 2006. It established basic hygiene rules for all food businesses and includes a specific set of hygiene rules for primary production, including training requirements. The general rules include the registration of food businesses and the implementation of Hazard Analysis Critical Control Points (HACCP) methodology by food processors, manufacturers and retailers. Full HACCP methodology is not initially being required for primary food production but management systems based on HACCP principles are required. In practice many primary producer businesses have adopted a HACCP approach.

EC Regulation No.853/2004 laying down specific hygiene rules for food of animal origin also came into force on 1 January 2006. It established additional, more detailed sets of hygiene rules for specific foods, including fishery products. It replaced Council Directive 91/493/EEC which was implemented in the UK by the Food Safety (Fishery Products and Live Shellfish) (Hygiene) Regulations 1998.

These hygiene Regulations do not apply to activities defined as primary production or to the farmer who sells directly to the final consumer or businesses supplying the fish consumer directly. However, such a sale must be within the local or neighbouring food authority and is

limited to a total maximum of 25 tonnes per year. Note, Regulation 178/2002 will apply under all circumstances and product supplied must not be unsafe.

The Food Hygiene (Scotland) Regulations 2006 (and the corresponding regulations for England, Wales and Northern Ireland) came into force on 11 January 2006 and enforced the Regulations EC No 852/2004 and EC No 853/2004 and set penalties for offences. It also contained national legislation which Member States of the EU are required or allowed to make.

Feed Legislation

Feed purchased from an authorised feed manufacturer or supplier will be provided with batch or package labelling in accordance with legal requirements and will be supported by a formal scheme meeting quality assurance standards. Where feed is supplied from out with the UK, farmers should seek written confirmation that it will meet all UK legal requirements. Handling and storage of feed on farm or at the shore base is the farmer's responsibility and must be undertaken to maintain feed quality and avoid feed contamination.

The Feed Hygiene Regulation (183/2005) came into effect in January 2006. It applies to businesses that make, use or market animal feeds. This includes most livestock farms, arable farms that grow, use or sell crops for feed use, and also fish farms. It replaced existing legislation on approval and registration under the Feeding Stuffs (Establishments and Intermediaries) Regulations 1999. Farmers, as primary producers, have to follow basic hygiene procedures in relation to the feed they use or grow and must ensure that hazards are properly assessed and risks are controlled.

Fish Health Legislation

The following list of legal instruments is not necessarily exhaustive, but does include the main instruments which pertain to aquaculture in Scotland.

The Aquatic Animal Health (Scotland) Regulations 2009: are Scottish regulations which have their origins with European legislation. They make provisions that require fish farms to be Authorised and Registered as a "Aquaculture Production Business" (APB). This requirement allows the Competent Authority to apply relevant conditions and expectations on fish farmers around fish health and biosecurity, in order to achieve registration and authorisation. Some controls are defined within the legislation (e.g. movements, unexplained mortality, surveillance), but others may be defined within Government policy, thus allowing a broad ranging approach to ensuring high standards of fish health and biosecurity. Controls adopted in relation to the Aquatic Animal Health (Scotland) Regulations 2009 primarily relate to exotic, listed (notifiable) diseases and support the maintenance of the UK's disease health status.

The legislation:

- Requires the authorisation of aquaculture production businesses (APBs) and processing facilities (PFs) wishing to process fish from APBs infected with certain listed diseases and subjects APBs and PFs to conditions associated with their authorisation.

- Requires that non-commercial undertakings, put and take fisheries and specialist transporters are registered.

- Requires that the competent authority establishes and maintains a publicly available register of authorised APBs and PFs.

- Applies certain conditions, certification requirements and provisions on the placing on the market of aquaculture animals.

- Requires disease prevention measures to be taken when aquaculture animals are transported.

- Requires that records are kept when aquaculture animals are transported.

- Obliges relevant persons to report the suspicion or confirmation of diseases or increased mortality in aquatic animals. (Relevant person is defined as the owners or persons attending aquatic animals, persons accompanying aquaculture animals during transport, any veterinarian or other professional involved in providing health services to those aquatic animals and any other person with an occupational relationship with aquatic animals.)

- Requires the competent authority to make initial designation notices (IDNs) or confirmed designation notices (CDNs) where it suspects or knows that a listed or emerging disease is present in aquatic animals in Scotland; stipulates what information and conditions may be contained in these IDNs and CDNs; stipulates what actions an inspector may take where an IDN or CDN is in place, how IDNs and CDNs are published and when they must be withdrawn.

- Gives an inspector powers to enter land and premises, search and examine that land or premises, require the production of documents, seize items and serve enforcement notices. It also lays out when and a person may appeal to the competent authority.

The Aquaculture and Fisheries (Scotland) Act 2007: as applied to fish farms provides specific controls around the management of parasites (notably sea lice) and containment. Secondary legislation linked to this Act has been developed to require the maintaining of records in relation to the prevention, control and reduction of parasites and the containment, prevention and recovery of escaped fish (The Fish Farming Businesses (Record Keeping) (Scotland) Order 2008), as well as the provision of data on sea lice counts (The Fish Farming Businesses (Reporting) (Scotland) Order 2020).

The legislation:

- Gives the purposes that an inspector may carry out inspections of fish farms and shellfish farms with regard to parasites and their control, including the collection of samples and examining and taking copies of documents.

- Gives the purposes that an inspector may carry out inspections of fish farms with regard to ascertaining whether an escape of fish has occurred, ascertaining the risk of an escape, assessing the containment and prevention of escapes measures as well as the measures in place to recover escaped fish. Inspections may include the collection of samples, examining and taking copies of documents and for the carrying out of tests where appropriate.

- Gives the purposes for which enforcement notices may be served. These are: the prevention reduction and reduction of parasites; the containment of fish; the prevention of the escape of fish; and the recovery of escaped fish.

- Details when an inspector may enter a fish farm and for what purpose, whom and what they make take with them and lays out the general offences.

The Fish Farming Businesses (Record Keeping) (Scotland) Order 2008

- Exercises powers to make an order in The Aquaculture and Fisheries (Scotland) Act 2007 and requires the maintenance and retention of records in relation to the prevention, control and reduction of parasites; and the maintenance and retention of records in relation to the containment, prevention and recovery of farmed fish.

Aquaculture and Fisheries (Scotland) Act 2013: as applied to fish farms applies further controls around the management of fish health through the adoption of farm management agreements and statements, controls associated with the operation of a wellboat, and provisions for the introduction of a technical standard for farm equipment (to mitigate the risk of escapes).

The Prohibition of Keeping or Release of Live Fish (Specified Species) (Scotland) Order 2003

- It is an offence to keep or release any fish of the species listed in the schedules to the Prohibition of Keeping or Release of Live Fish (Specified Species) (Scotland) Order without a licence granted by the Scottish Ministers.

The Animal By-Products (Scotland) Regulations 2003

- The Animal By-Products Regulation provides a definition of high risk and low risk material and prescribes the appropriate methods of disposed of such material. High risk material includes fish that have died but were not slaughtered for human consumption. High risk material must be disposed of by rendering, incineration or, in exceptional circumstances only, burial.

The Importation of Salmonid Viscera Order 1986

- It is an offence to import any viscera of fish of the family Salmonidae, whether or not detached from dead fish, without a licence.

The full text of the Regulations, Acts and Orders listed above can be found in full at the Office of Public Sector Information (OPSI) web-site at http://www.opsi.gov.uk . Details of all the EC legislation pertaining to fish health, including links to Directives, Decisions and Regulations, can be obtained at http://eur-lex.europa.eu/en/index.htm .

Environmental Legislation

Scotland, through the UK's membership of the EU, is a signatory to a number of international conventions, including the Oslo/Paris convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) and the Convention for the Conservation of Salmon in the North Atlantic, which is taken forward through the North Atlantic Salmon Conservation Organisation (NASCO). It also has a wide range and depth of environmental legislation and legislation that has environmental management or conservation elements. Much of this legislation derives from European legislation, but is transposed into Scottish law to allow its application in Scotland.

There is not a simple way to classify the legislation of environmental significance. Some EU legislation and related Scottish Acts of Parliament or Scottish Statutory Instruments (SSI) are designed to address a specific issue or topic area; others have a main objective, but also include some subsidiary, but important objectives and yet other represent 'framework legislation' which is essentially cross-cutting, addressing a number of separate issues. The sections which follow are designed to provide a brief summary of relevant legislation and guidance mainly on environmental legislation. It is not exhaustive, but rather covers the main instruments which pertain to the management of aquaculture in Scotland. For ease of presentation only, the legislation has been grouped under four broad headings of: Planning Related; Environmental Protection; Environmental Conservation and Framework. In each, main items are listed alphabetically. Due to the nature of each piece of legislation, some cross over between topics occurs. Consequently, there is some duplication in the text below, to ensure completeness.

In practice, should farmers have specific questions about particular environmental legislation, these should be addressed to the competent authority for the legislation under consideration; general information and guidance will often be available on their websites.

Planning-Related Legislation

Scotland, through the UK's membership of the EU, is a signatory to a number of international conventions

Framework Legislation – Planning (Scotland) Act 2019:

The Planning (Scotland) Act 2019 is a piece of legislation that reformed Scotland's planning system. Passed by the Scottish Parliament in June 2019 it introduced changes to how planning decisions are made, focusing on community involvement, strategic planning, and sustainable development. One of the key features of this legislation was the strengthening of the National Planning Framework to reach statutory development plan status, and thus part of material considerations in planning decisions.

The Town and Country Planning (Scotland) Act 1997, as amended by the Planning (Scotland) Act 2019:

The Planning (Scotland) Act 2019 introduced amendments to the T&CP (Scotland) Act 1997, but none are explicitly aimed at the aquaculture sector.

The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017:

The regulations pass the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011. They modernised Scotland's EIA system, updating environmental protection, public participation, and decision-making transparency.

The regulations set out the legal framework for Environmental Impact Assessments (EIA) in Scotland's planning system, implementing requirements of the EU Directive 2011/92/EU, as amended by Directive 2014/52/EU. They ensure that environmental considerations are integrated into the planning process, specify the information to be contained in an environmental statement, list the consultation bodies, and provide criteria for deciding whether projects are likely to have significant environmental effects. All developments falling within a description in Schedule 1 to the 2017 EIA Regulations require EIA. Developments of a type listed in Schedule 2 to the 2017 EIA Regulations will require EIA if they are likely to have a significant effect on the environment, due to factors such as their size, nature or location. Fish farms are Schedule 2 developments.

Development Plans (National, Regional, Local):

Development plans set out how places will change into the future, including the long-term vision of where development should and shouldn't happen. Development plans show where new

homes and workplaces will be built, how services and facilities such as schools and travel will be provided, and identify the places and buildings we value and want to protect.

Development plans guide decisions on applications for planning permission made by regulators or consenting (i.e. planning) authorities. Decisions on planning applications must be made in accordance with the development plan, unless there are material considerations that indicate otherwise.

Statutory development plan for Scotland's long-term terrestrial spatial development (National Planning Framework 4 - NPF4):

Scotland's National Planning Framework (NPF) is a long-term strategic plan which sets out the Scottish Government's vision for spatial development, infrastructure, and land use across the country. It guides planning decisions at national, regional, and local levels, shaping how Scotland develops in the future. The fourth National Planning Framework (NPF4) was adopted February 2023, passing NPF3 and Scottish Planning Policy (SPP). NPF4 is a material consideration in all planning decisions, meaning it must be taken into account by planning and decision-making authorities when assessing development proposals taking place in Scotland's terrestrial areas.

Statutory development plan for Scotland's long-term marine and coastal spatial development (National Marine Plan - NMP):

Scotland's National Marine Plan (NMP) was adopted in March 2015, meeting obligations required under the Marine (Scotland) Act 2010 (for inshore waters, out to 12 nautical miles) and the UK Marine and Coastal Access Act 2009 (for offshore waters, 12 to 200 nautical miles). NMP is a material consideration in all planning decisions, meaning it must be taken into account by planning and decision-making authorities when assessing development proposals that take place in Scotland's marine and coastal areas.

Work is underway to adopt a renewed version of the NMP, following statutory reviews in 2018 and 2021, and further reviews from marine stakeholders across Scotland. This will be the National Marine Plan 2 (NMP2).

Both these development plans give significant weight to biodiversity loss and climate change.

Regulatory and Consenting Bodies:

Lease option Agreement, Seabed Lease & Crown Estate Scotland - The Crown Estate (Scotland) Act 2019:

Crown Estate Scotland manages most of the seabed around the Scotland out to a distance of 12 nautical miles and has a statutory duty to obtain a return for any area of seabed or foreshore

within Crown ownership that is used for commercial purposes. Thus, a seabed lease from Crown Estate Scotland is required to install and operate a fish farm in Scottish inshore marine areas. This lease does not extend to freshwater farms or currently to offshore marine areas (beyond 12 nautical miles). Fish farms must apply for a lease from The Crown Estate Scotland and pay rent to install, maintain and operate on the seabed. Most existing leases are automatically renewed at the end of their lease period. A Crown Estate Scotland lease is generally granted for a period of 25-years and is dependent on securing Planning Permission from Consenting Authorities.

Prior to obtaining a seabed lease and to allow aquaculture businesses the opportunity to explore potential areas for development, the Crown Estate Scotland allow a company to apply for a Lease Option Agreement (LOA). This secures the area of seabed, while planning permission and other licences are sought. An aquaculture company is allowed up to five LOAs at any one time, which will expire after three years with the condition that a planning permission application should be submitted to the relevant Local Authority within two years of taking out the LOA.

Marine License & Marine Directorate LOT – Marine (Scotland) Act 2010:

Fish farming is a marine activity with the requirement to obtain a marine license from Marine Directorate Licensing and Operations Team (MD-LOT). Serving under the Marine (Scotland) Act 2010), a marine license combines the previously separate Food and Environment Protection Act 1985 (FEPA) and Coast Protection Act 1949 (CPA) consents. The relevant marine licences for finfish aquaculture are focused on navigational safety considerations.

With respect to finfish aquaculture, three types of activities require a marine licence(s):

- Equipment – including mussel lines, fish farm cages, walkways/pontoon;
- Moorings (i.e. deposits on the seabed);
- and Discharge of sea lice treatments from wellboats.

Environmental Protection Legislation

The Aquaculture and Fisheries (Scotland) Act 2013: The purpose of the Aquaculture and Fisheries Act is to ensure that farmed and wild fisheries - and their interactions with each other - continue to be managed effectively, maximising their combined contribution to supporting sustainable economic growth with due regard to the wider marine environment.

European Directive on Dangerous Substances (76/464/EEC), which was codified and repealed by Directive 2006/11/EC on Pollution Caused by Certain Dangerous Substances Discharged into the Aquatic Environment of the Community defined principles for the control of lists of substances, ranging from those which are toxic, persistent and which bio-accumulate (List I substances) to those which have 'deleterious effects upon the aquatic environment' (List II substances). Some chemicals used in marine fish farming fall within the List II definition.

The Directive requires Member States to introduce programmes to reduce pollution by List II substances by ensuring their authorisation on the basis of emission standards calculated from water quality objectives (in Scotland these are the *Environmental Quality Standards*). The requirements of the Directive may involve product substitution (requiring the use of a less hazardous chemical) and take into account the 'latest economically feasible technical developments'. The provisions of the Directive will be subsumed into the *Water Framework Directive* in 2013.

In the interim period, SEPA has adopted transitional arrangements (see *SEPA Policy: Control of Priority and dangerous Substances and Specific Pollutants in the Water Environment,* www.sepa.org.uk). It has set indicative limits for the substances concerned and publishes information on these and other pollutants in the *Scottish Pollutant Release Inventory (SPRI)* (http://www.sepa.org.uk) an electronic database of releases of pollutants, complying with *Regulation EC No 166/2006 Concerning the Establishment of a European Pollutant Release and Transfer Register.*

European Directive on the Sustainable Use of Pesticides (2009/128/EC) (SUD) came into effect on the 25 November 2009 and must be transposed into Scottish legislation by the corresponding date in 2011. So some changes in the present systems of approval and regulation of products such as algaecides, antifouling products, biocidal paints, rodenticides and insecticides may therefore be anticipated.

Key features of the Directive include: the establishment of National Action Plans; compulsory testing of application equipment, certification of operators and distributors, access to certification for advisors; a ban (subject to derogations) on aerial spraying; special measures to protect the aquatic environment, public spaces and conservation areas; minimising the risks to human health and the environment through handling, storage and disposal; and the promotion of low input regimes, including Integrated Pest Management (IPM) and non-chemical alternative products.

The main legislation controlling the sale, supply and use of plant protection products is *Council Directive 91/414/EEC Concerning the Placing of Plant Protection products on the Market* which is implemented in the UK through the *Plant Protection Products Regulations 2005* (PPPR). Active substances which were on the market when the Directive came into force and which have not yet been reviewed by the EU remain regulated under the previous pesticides legislation, the *Control of Pesticides Regulations 1986* (as amended in 1997) (COPR). Non-agricultural products are currently regulated under the same legislation. The *Chemicals Regulation Directorate* of the *Health and Safety Executive* (see http://www.hse.gov.uk/biocides/copr) operates the regulatory systems for pesticides and biocides on behalf of UK Ministers. Scottish Ministers have responsibility for policies on the products in Scotland.

Environmental Protection Act (1990) confers on businesses a duty of care on any person who produces, carries, keeps, treats or disposes of controlled waste to take all such measures to prevent the escape of the waste from his control, to transfer the waste to only to an authorised

person or to a person for authorised transport purposes. This legislation is reflected in the *Waste Management Duty of Care A Code of Practice*.

Food and Environment Protection Act 1985 (FEPA) amongst other wider provisions this Act deals with the licensing of deposition of anything in the sea or under the seabed in UK waters. It applies to marine vessels, such as well-boats, wishing to discharge contaminated waste water or chemicals at sea.

Integrated Pollution Prevention and Control Directive (96/61/EC) (known as IPPC) was transposed into Scottish law by the *Pollution Prevention and Control Act 1999, and the Pollution Prevention and Control (Scotland) Regulations 2000* (SI 2000/323) in Scotland (known as the PPC Regulations). The regulations do not apply to fish farms but are applicable to processing units and may be a consideration where there farm-associated ensiling of mortalities or fish waste.

Water Environment and Water Services (Scotland) Act 2003 transposed WFD into Scottish legislation and gave Scottish ministers powers to introduce regulatory controls over water activities, in order to protect, improve and promote sustainable use of Scotland's water environment.

This WEWS Act defined the water environment to include wetlands, rivers, lochs, transitional waters (estuaries), coastal waters and groundwater. The Act also defined the duties of SEPA in its protection of the water environment. It provided for the establishment of river basin districts, each requiring an environmental objective and river basin management plan; and for preparation, approval and review of the plans and the monitoring of the status of the water in each river basin district.

The WEWS Act includes provisions for:

- preventing further deterioration of, and protecting and enhancing, the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on those aquatic ecosystems;
- promoting sustainable water use based on the long-term protection of available water resources;
- enhancing protection and improvement of the aquatic environment through, amongst other things, specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing out of discharges, emissions and losses of the priority hazardous substances;
- ensuring the progressive reduction of pollution of groundwater and preventing further pollution of it, and contributing to mitigating the effects of floods and droughts.

The WEWS Act introduced the concept of 'regulation of controlled activities', including:

- activities liable to cause pollution of the water environment;
- abstraction of water from the water environment;

- the construction, alteration or operation of impounding works in surface water or wetlands;
- carrying out building or engineering in the vicinity of inland waters or wetlands which are likely to have an adverse significant effect on the water environment.

It also defined 'pollution' in relation to the water environment as: the direct or indirect introduction, as a result of human activity, of substances or heat into the water environment, or any part of it, which may give rise to any 'harm'. In this context 'harm' was defined as including: harm to the health of human beings or other living organisms, the quality of the water environment, including the quality of the water environment as whole and the impairment of, or interference with, the quality of aquatic ecosystems or terrestrial ecosystems directly depending on aquatic ecosystems. It also included offences to the senses of human beings, damage to property, or impairment of, or interference with, amenities or other legitimate uses of the water environment.

Water Environment (Controlled Activities) (Scotland) Regulations 2005 (Controlled Activities Regulations) (SSI 2005 No. 348) which came into effect in April 2006 provided the regulatory controls to put the WEWS Act into effect. They have subsequently amended by *The Water Environment (Controlled Activities) (Third Party Representations etc) (Scotland) Regulations 2006*; and *The Water Environment (Controlled Activities) (Scotland) Amendment Regulations 2007*.These regulations are more commonly known as the Controlled Activities Regulations, or 'CAR'.

Under CAR, SEPA may authorise the carrying on of a controlled activity and impose conditions necessary for the protection of the water environment. Such conditions may be imposed as considered necessary or expedient for the purposes of protection of the water environment. Where a condition is imposed it is the responsibility of the applicant to obtain all consents necessary to allow the condition to be complied with.

When considering whether to grant an authorisation and when imposing conditions in respect of a licence under this regulation, SEPA will have regard to all controlled activities being carried on or likely to be carried on in the area affected and to any agreement reached between different persons concerning controlled activities carried on in the relevant area of the water environment. SEPA will only grant authorisation if it is satisfied that a person has been identified who will be responsible for securing compliance with the authorisation and the conditions specified in it.

CAR introduced three levels of authorisation for 'Controlled Activities': (a) general binding rules: (b) registration; and (c) simple licences or complex licences which are proportionate to the degree of environmental risk. Registrations and licences require assessment and approval by SEPA. Licences can cover linked activities on a number of sites over a wide area, as well as single or multiple activities on a single site. It is an offence to undertake a controlled activity without being authorised and not complying with the conditions of an authorisation. All aquaculture units require therefore require SEPA authorisation in one of the following categories.

Registration

- All non-commercial fish hatcheries for native fish.
- Tank fish farms/hatcheries up to 0.5 tonnes capacity.

Simple Licence

- Tank fish farms/hatcheries >0.5 tonnes capacity.
- Freshwater cage fish farms ≤2 tonnes capacity.
- Marine cage/tank fish farms ≤50 tonnes capacity.

Complex Licence

- Freshwater cage fish farms >2 tonnes capacity.
- Marine cage/tank fish farms >50 tonnes capacity.

For guidance see http://www.sepa.org.uk/customer_information/fish_farming.aspx

Water Framework Directive (2000/60/EC) (WFD) is a wide-ranging piece of European environmental legislation that was transposed into Scottish Law as the Water *Environment Water Services Act 2003*. The subsidiary *Water Environment (Controlled Activities) (Scotland) Regulations 2005* introduce the control regimes set out in the Directive. The overall objective of the WFD is to bring about the effective co-ordination of water environment policy and regulation across Europe to:

- prevent deterioration and enhance status of aquatic ecosystems, including groundwater;
- promote sustainable water use;
- reduce pollution; and
- contribute to the mitigation of floods and droughts.

These aims have heavily influenced the way SEPA regulates marine and freshwater fish farming.

Conservation Legislation

Aquaculture and Fisheries (Scotland) Act 2007 contains provisions on the control of parasites and disease, the containment of, prevention of escape of, and recovery of escaped fish.

Conservation (Natural Habitats, &c.) (Scotland) Regulations 1994 (as amended) (SSI 1994 No 2716) transposed *Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora* (Habitats Directive) and *Council Directive 79/409 on the Conservation of Wild Birds* (Birds Directive) into Scottish law.

The Directives aim to protect the wild plants, animals, birds and habitats that make up our diverse natural environment. The Directives created a European network of protected sites, the Natura 2000 network, which represent areas of the highest value for natural habitats and species of

plants and animals which are rare, endangered or vulnerable in the European Community. The network includes area designations:

- Special Areas of Conservation (SAC) where areas support rare, endangered or vulnerable natural habitats and species of plants or animals (other than birds):
- Special Protection Areas (SPA). Where areas support significant wild birds and their habitats:

Some areas may become both (SAC) and (SPA).

Fish Farming Businesses (Record Keeping) (Scotland) Order 2008 (SSI No 326) sets out the provisions for the records which must be compiled and retained by those engaged in the business of fish farming in respect of each site in which they farm (see Annex 6).

Natural Heritage (Scotland) Act 1991 established Scottish Natural Heritage (SNH, now "NatureScot") 'To secure the conservation and enhancement of, and to foster understanding and facilitate the enjoyment of, the natural heritage of Scotland. The 'natural heritage of Scotland' includes the flora and fauna of Scotland, its geological and physiographical features, its natural beauty and amenity. The Act describes the general functions of NatureScot with regard to nature conservation, development projects and Natural Heritage areas.

Nature Conservation (Scotland) Act 2004 sets out a series of measures which are designed to conserve biodiversity and to protect and enhance the biological and geological natural heritage of Scotland. It places a duty on every public body to further the conservation of biodiversity consistent with the proper exercise of their functions and increases protection for Sites of Special Scientific Interest (SSSI), and strengthens wildlife enforcement legislation.

Framework Legislation

Environmental Liability (Scotland) Regulations 2009 transposes into Scottish law the provisions of Directive 2004/35/CE 2004 of the European Parliament and of the Council of 21 April 2004 on Environmental Liability with regard to the *Prevention and Remedying of Environmental Damage*. It placed an obligation on operators of any type to take preventative measures where there is an imminent threat of significant environmental damage and also remediate any significant 'environmental damage' caused by their activities. The regulations are not retrospective and do not apply to environmental damage caused prior to the regulations coming into force.

Three categories of 'environmental damage' are covered by the regulations:

- *Biodiversity* (protected species and natural habitats) of European importance in terms of the Birds directive and Habitats Directive;
- *Water* (damage to water bodies) in terms of the Water Framework Directive;
- *Land,* where public health is at a significant risk of being affected.

For protected species and habitats other than the marine habitat, NatureScot is the competent authority. Likewise SEPA is the competent authority for 'Land' and also for 'Water' as defined under the WEWS Act 2003. MS has a more general responsibility for all three categories as they apply to the marine environment but it is likely to use NatureScot and SEPA as advisers on matters that cross boundaries of responsibility.

Marine (Scotland) Act 2010 received Royal Assent in March, 2010. The Act introduced a framework for the sustainable management of the seas around Scotland, seeking to ensure that protection is integrated with the economic growth of marine industries. Implementation of the measures in the Act is in progress, in some cases through secondary legislation. Full measures contained in the Act are unlikely to be in place before 2012. From an aquaculture viewpoint, the Act focuses on the following.

- **Marine planning**: a new statutory marine planning system to manage the demands on the seas. This will operate at a regional level with the planning strategy feeding in to the Local Authority Strategic Plans.
- **Marine licensing**: a new licensing system under Marine Directorate for most marine activities, excepting aquaculture. Aquaculture planning and statutory regulation will remain under the present arrangements of Local Authority planning control and regulation, mainly through SEPA, Marine Directorate and NatureScot.
- **Marine conservation**: improved marine nature and historic conservation with new powers to protect and manage areas of importance for marine wildlife, habitats and historic monuments. This may impinge on the regional planning strategies for use of marine sites.

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