



# Code of Good Practice

## Chapter 2: Freshwater Tanks, Ponds & Raceways



code of  
good practice  
scottish finfish aquaculture

# CHAPTER 2: FRESHWATER TANKS, PONDS AND RACEWAYS

## Table of Contents

	Page No.
<b>AMENDMENT CONTROL</b> .....	<b>4</b>
<b>1. DOCUMENTS AND TRAINING</b> .....	<b>5</b>
➤ Documentation control.....	5
➤ Training.....	5
<b>2. FOOD SAFETY AND CONSUMER ASSURANCE</b> .....	<b>6</b>
➤ Use of licensed and approved treatments .....	6
➤ Traceability to farm and enclosure of origin .....	6
<b>3. FISH HEALTH AND BIOSECURITY</b> .....	<b>7</b>
➤ Key principles of fish health and biosecurity management.....	7
➤ Importation of gametes and fertilised eggs.....	8
➤ Importation of live salmonids .....	9
➤ Site disinfection .....	10
➤ Ongrowing in freshwater tanks, ponds and raceways .....	10
➤ Minimising risks presented by restocking.....	11
➤ Harvesting operations .....	11
➤ Biological vectors of fish disease .....	12
➤ Use of medicinal products .....	13

#### **4. MANAGING AND PROTECTING THE ENVIRONMENT..... 18**

- **Fuel oil handling and storage ..... 18**
- **Redundant equipment and waste material ..... 18**
- **Noise ..... 18**
- **Lights ..... 18**
- **Odours ..... 19**
- **Containment ..... 19**

#### **5. FISH WELFARE AND CARE ..... 24**

- **Veterinary Health Plan and Biosecurity Plan..... 24**
- **Fish farm locations ..... 24**
- **Design and planning of farms, equipment and systems ..... 24**
- **Water supply and quality..... 25**
- **Light ..... 26**
- **Inspection and testing ..... 27**
- **Predator control ..... 27**
- **Stockmanship and husbandry ..... 28**
- **Handling live or conscious fish ..... 28**
- **Assessing suitability for transfer to sea ..... 29**
- **Crowding ..... 30**
- **Removal and disposal of dead and moribund fish ..... 31**
- **Marking ..... 31**
- **Withholding feed ..... 31**
- **Stocking density ..... 32**
- **Grading ..... 32**
- **Transport of live fish..... 33**
- **Harvesting and culling..... 34**

<b>6. FEED AND FEEDING .....</b>	<b>34</b>
➤ <b>Feed formulation.....</b>	<b>34</b>
➤ <b>Use of feed .....</b>	<b>34</b>

*Front cover photos courtesy of SSPO and British Trout Association*

## AMENDMENT CONTROL: FRESHWATER TANKS, PONDS AND RACEWAYS

The CoGP will be reviewed and updated, as necessary, to ensure it continues to take account of current developments in technology and best practice.

All companies participating in the Code will be advised of changes as they occur. The version of the Code accessible on [www.thecodeofgoodpractice.co.uk](http://www.thecodeofgoodpractice.co.uk) is current and includes all material updates to the Freshwater Tanks, Ponds and Raceways chapter as listed below.

<b>Amendment date</b>	<b>Section N°/Topic</b>
30 Jan 2015	3.59 - 3.80/Vaccination
	4.21/Containment
13 July 2015	3.7 Freshwater Mortality Reporting (new)

# CHAPTER 2: FRESHWATER TANKS, PONDS AND RACEWAYS

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*Many aspects of farming fish in freshwater tanks, ponds and raceways are regulated under European, UK and Scottish law. The undernoted provisions are additional to legal requirements.*

## 1 DOCUMENTS AND TRAINING

### *Documentation Control*

- 1.1 Documents, records and other information relevant to the management of finfish farming operations in freshwater tanks, ponds and raceways should be held and effectively controlled.
- 1.2 All documents should be the current version and be properly authorised.
- 1.3 All documents should be clearly written, contain sufficient detail for the purpose and be readily accessible to the relevant personnel.
- 1.4 Reasons for amendments to, and replacement of, documents should be recorded.
- 1.5 Other documents should be retained for an appropriate time and be available for inspection.

### *Training*

- 1.6 Documented evidence of training of individuals in activities relevant to the farming of fish in freshwater tanks, ponds and raceways should be maintained.

## 2 FOOD SAFETY AND CONSUMER ASSURANCE

### *Use of Licensed and Approved Treatments*

- 2.1 Veterinary medicines should be used prudently under the conditions set out in the data sheet and/or as advised by the veterinary surgeon.
- 2.2 Details of treatments used should be covered in Written Control Procedures which should describe:
  - 2.2.1 The involvement of the nominated veterinary surgeon;
  - 2.2.2 The justification for the use of a treatment;
  - 2.2.3 The nature of the treatment used;
  - 2.2.4 The circumstances under which fish are treated;
  - 2.2.5 Official controls on the use of the treatment including, as appropriate, Controlled Activity Regulations (CAR) licence conditions;
  - 2.2.6 Measures in place to prevent unacceptable residues remaining in edible tissues when fish enter the human food chain.

### *Traceability to Farm and Enclosure of Origin*

- 2.3 Farmers should identify the suppliers of eggs, fish, etc. going into their production processes.
- 2.4 Traceability should be maintained throughout production processes.
- 2.5 Businesses to which products have been supplied should be identified.
- 2.6 Traceability records should be maintained and such information made available to relevant parties on demand.

### 3 FISH HEALTH AND BIOSECURITY

#### *Key Principles of Fish Health and Biosecurity Management*

- 3.1 Companies should have a Veterinary Health Plan (VHP) and Biosecurity Plan (BP) covering relevant aspects as set out in Annex 2.
- 3.2 VHPs and BPs should be reviewed at the end of each production cycle.
- 3.3 All staff engaged in the production of fish should be familiar with the relevant aspects of the VHP and BP.
- 3.4 Companies should have written procedures to ensure that production staff notify company management immediately when disease is suspected, where abnormal behaviour is evident, or where morbidity or mortality levels are unusually high or subject to rapid increase.
- 3.5 Dead fish should be removed from tanks, ponds and raceways as soon as possible.
- 3.6 At all stages, the number of dead fish should be recorded, along with, where possible, a record of the cause of death.
- 3.7 Where the level of fish mortality exceeds the threshold(s) below, this should be notified to Marine Scotland's Fish Health Inspectorate and the veterinary surgeon who has the fish under his/her care:
  - Egg to 1st feed – 10 weeks – 6% weekly
  - 1st feed to 5g – 10 weeks – 3% weekly
  - 5g to smolting – 20 weeks – 1.5% weekly
- 3.8 Subject to safe operating conditions, in the event of a disease outbreak, dead fish should be removed daily.

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Good hygiene practice includes within its scope the conduct and hygiene of persons concerned, their personal clothing, personal protective equipment and other equipment used by them on site.

- 3.9** Fish farm personnel and visitors to fish farms should be made aware of the role they play in minimising the risk of disease transmission, following good hygiene practice and procedures.
- 3.10** Risk assessments should be conducted by trained personnel experienced in the appropriate methodology (see Annex 3).
- 3.11** The outcome of risk assessments should be communicated to the relevant production personnel and other personnel responsible for implementation of the outcomes.
- 3.12** Farmers should reduce any risk to fish health associated with the presence of wild birds, mammalian predators and vermin by ensuring the secure storage of feed, good feeding practice and the secure temporary storage of dead fish.

### ***Importation of Gametes and Fertilised Eggs***

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*It is acknowledged that risks to fish health associated with the movement of gametes and fertilised eggs are considerably lower than risks associated with the movement of live fish.*

- 3.12** Companies proposing to import eggs from overseas should visit the sites on which the eggs are produced and audit the procedures being followed on these sites to satisfy themselves that good practice and appropriate risk management are being followed.
- 3.13** Proposals to import gametes and fertilised eggs should be underpinned by a documented risk assessment.

- 3.14** A decision to import should only be taken if the outcome of the risk assessment is satisfactory (see Annex 3).
- 3.15** Eggs should only be imported from certified disease-free sources.
- 3.16** In all cases, written evidence should be provided that eggs have been properly disinfected.
- 3.17** Water and packaging which has come into contact with imported eggs should be properly disinfected and disposed of by an approved method.

### ***Importation of Live Salmonids***

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*The importation of live salmonids is the subject of European and UK legislation. The undernoted provisions are additional to legal requirements.*

- 3.18** Companies proposing to import live salmonids from overseas should visit the sites on which the fish are being produced and audit site procedures to satisfy themselves that good practice and appropriate risk management are being followed.
- 3.19** Proposals to import live salmonids should be underpinned by documented risk assessments.
- 3.20** A decision to import should only be taken if the outcome of the risk assessment is satisfactory.
- 3.21** Risk assessments should take into account the potential to introduce *Gyrodactylus salaris*.
- 3.22** Farmers should hold on record appropriate certification documents to demonstrate that any salmonids to be imported are free from pathogens.

- 3.23** Farmers should hold records to demonstrate that salmonids to be imported have been vaccinated, where this is appropriate.
- 3.24** Live salmonids imported from approved zones or compartments in countries of lower health status, as defined by the World Organisation for Animal Health (OIE, [www.oie.int](http://www.oie.int)), including Norway and third countries, should be held in quarantine in secure land-based facilities with appropriate effluent disinfection, for a period of no less than 3 months, during which time their health should be monitored.
- 3.25** During the time that such imported salmonids are being held in quarantine, testing for listed, notifiable and other potentially serious diseases should be carried out on all dead fish and any fish showing signs of morbidity.
- 3.26** Quarantine conditions should only be lifted and fish positively released where test results are negative.
- 3.27** Where fish cannot be positively released, measures to deal with the fish should be in accordance with OIE guidance.
- 3.28** Following importation, movements of imported live salmonids should only take place on the basis of a satisfactory outcome from a documented risk assessment (see Annex 3).

### ***Site Disinfection***

- 3.29** Tanks should be cleaned and disinfected when empty, along with associated equipment.
- 3.30** Disinfection should be conducted to a level sufficient to inactivate pathogens considered to pose significant risk (see Annex 4).

## ***Ongrowing in Freshwater Tanks, Ponds and Raceways***

- 3.31** Freshwater tank, pond and raceway sites should contain only one commercial species.
- 3.32** As far as is reasonably practicable in freshwater ongrowing areas, personnel, equipment and personal protective equipment should be site specific.
- 3.33** Where movement between freshwater ongrowing areas is unavoidable, cleaning and disinfection should, as far as is reasonably practicable, be in accordance with the Standard Disinfection Protocols (see Annex 4).
- 3.34** Helicopter buckets, vehicles and road transport equipment used for fish transfer should be disinfected, as required, according to recommended practice (see Annex 4).
- 3.35** Documented evidence of disinfection should be obtained from those responsible for transportation.
- 3.36** When salmon smolts are ready for transfer from freshwater ongrowing sites to sea pens, they should receive a general health check on the day of loading and be in good health when loaded.

## ***Minimising Risks Presented by Restocking***

- 3.37** Fish farmers, fishery and river owners, District Salmon Fishery Boards and others involved in the movement of fish between freshwater bodies should be able to demonstrate an understanding of the risks posed by such activities.
- 3.38** All decisions to place fish into water bodies upstream or downstream of a hatchery or freshwater fish farm should be based on a satisfactory outcome from a documented risk assessment carried out by the party receiving the fish.

**3.39** The preparation of such a documented risk assessment should involve the party supplying the fish and operators of hatcheries or fish farms that might be affected by stocking activities.

### ***Harvesting Operations***

**3.40** The method used to crowd fish, remove them from tanks, ponds and raceways and harvest them should be assessed for the risk of escapes and, where appropriate, contingency arrangements put in place to minimise the risk.

**3.41** Bleeding of fish should take place at a facility where the blood water is contained.

**3.42** Blood water and effluent should be contained and disinfected so as to minimise the risk of spread of pathogens.

**3.43** Appropriate containment measures should be in place to prevent the leakage of blood water from bins, etc.

**3.44** Harvest bins should be checked for damage, thoroughly cleaned and disinfected between operations.

**3.45** Equipment used for on-site harvesting should be dedicated to individual sites or, if moved between sites, should be thoroughly cleaned and disinfected before being moved.

**3.46** At the end of each period of harvesting, all equipment should be thoroughly cleaned and disinfected.

**3.47** All activities involving movement of fish, cleaning and disinfection of bins and equipment should be recorded and the records retained for an appropriate time.

## ***Biological Vectors of Fish Disease***

### *Birds and Mammals*

**3.48** Transmission of infectious agents by birds and mammals should be minimised through:

3.48.1 Measures designed to exclude birds and mammals from areas where farmed fish are held;

3.48.2 Hygienic procedures for handling dead fish;

3.48.3 Feeding practices that minimise wastage.

### ***Use of Medicinal Products***

**3.49** Farmers should prepare and implement a VHP and a BP, which set out biosecurity protocols, preventative measures and treatments (including the use of vaccines, measures for the control of fungus in freshwater, etc.). (See Annex 2).

**3.50** Where therapeutic treatment is required, this should be initiated at the earliest opportunity.

**3.51** Where therapeutic treatment is required, accurate information on the health status of fish, biomass, temperature, etc., should be provided to the attending veterinary surgeon to assist in the calculation of correct dose rates, withdrawal periods, etc.

**3.52** The prescribing veterinary surgeon should always be made aware of any other treatments that have recently been, or are currently being administered, along with other circumstances likely to affect treatments.

**3.53** When medication is to be applied, clear written instructions on the use of the medicine should be obtained and communicated effectively to the personnel responsible for its application.

- 3.54** The recommended course of treatment at the correct dosage should be completed.
- 3.55** In circumstances where this is not possible, treatment may be curtailed. Where treatment is terminated early, this should be recorded and further advice sought from the veterinary surgeon.
- 3.56** To avoid the possibility of contamination of unmedicated feed with medication, feed bins or hoppers should be emptied and cleaned at the end of a period of medication.
- 3.57** The veterinary surgeon or other person supplying the product should advise on the appropriate withdrawal period.

#### *Suspected Adverse Reactions (SARs)*

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*A Suspected Adverse Reaction (SAR) is a harmful and unintended reaction which may be due to exposure to a veterinary medicine administered to an animal at its normal dose. A human SAR may also occur, in this case in a person administering a veterinary medicine (e.g. through self-injection with a vaccine) or a person exposed to a recently treated animal.*

*Companies holding a Marketing Authorisation (MA) for veterinary medicines, including fish medicines, are legally obliged to report suspected adverse reactions within 15 days of receiving a report and at specified periods in the case of non-serious adverse reactions. Further information is available from the [Veterinary Medicines Directorate](#).*

- 3.58** Farmers should record SARs, both in fish being treated and in persons involved in the application of a treatment.

- 3.59** SAR reports should be directed via the veterinary surgeon, the supplier, or submitted direct to the Veterinary Medicines Directorate (VMD).

### *Vaccination*

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*As in most other livestock, vaccines can be used in farmed fish to prevent diseases and reduce the need for medicinal treatments. Vaccination of Scottish salmon is now normal practice and has had a demonstrable effect in maintaining fish health while minimising the use of antibiotics. Good practice in relation to vaccination is described in 'Responsible use of vaccines and vaccination in fish production' produced by [The Responsible Use of Medicines in Agriculture Alliance \(RUMA\) in 2006](#)*

- 3.60** Where appropriate, VHPs and BPs should include a vaccination regime to protect fish from diseases which may present a risk to their health.
- 3.61** Farmers should develop documented SOPs to be followed when vaccinating populations of fish.
- 3.62** SOPs should draw on information supplied by the prescriber and vaccine manufacturer, along with any guidance prepared by third parties.
- 3.63** If a vaccination contractor is engaged, SOPs should be mutually agreed and should specify responsibilities of all parties involved.
- 3.64** All of those directly involved in handling fish on the day of vaccination, in anaesthesia of fish and in the delivery of vaccines into fish should be appropriately trained and competent.
- 3.65** It is recommended that training is carried out to Lantra-approved or similar standard.

**3.66** Feeding should be withdrawn from fish to be vaccinated for an appropriate period, in accordance with Data Sheet recommendations and fish welfare guidance.

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*Vaccines must be used and stored in accordance with the manufacturer's data sheet and/or the advice of the person prescribing the vaccine. Vaccines for use in Scottish salmon are categorised as either POM-V or POM-VPS; however only a veterinarian may prescribe any vaccine for use outwith the conditions of its Marketing Authorisation, which may include use in fish of a specific size or within a temperature range.*

**3.67** In order to ensure that the effectiveness is maximised, significant size variation in the fish to be vaccinated should be kept to a minimum.

**3.68** Fish should therefore be appropriately graded in preparation for vaccination.

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*The temperature of the water in which vaccinated fish are held pre- and post-vaccination will often have an important bearing on the effectiveness of the vaccine and the protection it confers.*

**3.69** The temperature of the water in which fish are held should be recorded in the week leading up to vaccination, and for a period (as indicated by product data sheets) afterwards.

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*Vaccines must be stored at the correct temperature, in accordance with Data Sheet specifications, in an appropriate container and must not be used after the expiry date.*

**3.70** Vaccination equipment should be maintained and used in a hygienic manner.

- 3.71** In the immediate lead up to vaccination operations, all machinery, equipment, tables, vaccination kit, PPE and other materials to be used should be checked to ensure that all that is required is available and fit for purpose.
- 3.72** Provisions should be made to ensure that automated vaccination equipment is manned at all times whilst in operation.
- 3.73** An appropriate regime for monitoring fish welfare during automated vaccination should be included in the relevant SOP.

*Where vaccination equipment is brought on site from elsewhere:*

- 3.74** The supplier should provide proof that the equipment has been appropriately disinfected;
- 3.75** The equipment should be disinfected before and after use;
- 3.76** Disinfection records should be maintained.
- 3.77** To verify that vaccines have been applied in an optimal manner, that they have assisted in achieving the required protection against the relevant pathogen(s), and to demonstrate that the health and welfare of the vaccinated fish remains good, fish should be examined at appropriate intervals during the procedure and after vaccination.
- 3.78** Any suspicion of adverse effect should be immediately reported to the person who prescribed the vaccine.
- 3.79** Booster vaccinations, if required, should be administered in accordance with manufacturers' directions and veterinary advice.

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*Records must be kept of all vaccination procedures conducted on site and must include the following information:*

- *date of vaccination;*
- *identification of the batch(es) of fish vaccinated;*
- *vaccine used (including batch numbers and method of application);*
- *details of dosage.*

*In addition to the legal requirements above:*

**3.80** The method of vaccination (e.g. manual, machine-assisted, fully-automated) should be recorded;

**3.81** The names of the personnel involved should be recorded.

## **4 MANAGING AND PROTECTING THE ENVIRONMENT**

### ***Fuel Oil Handling and Storage***

**4.1** Contractors and third parties working on the site should have a contract which specifies the requirement to work within the conditions of this CoGP.

### ***Redundant Equipment and Waste Materials***

**4.2** All waste materials such as feed bags, etc. should be carefully collected, properly segregated, stored and recycled or disposed of within a defined timescale.

### ***Noise***

**4.3** Farmers should ensure that equipment that creates significant noise (air blowers, generators, etc.) is suitably muffled in order to prevent unacceptable disturbance to wildlife or humans. *Advice on suitable measures may be obtained from the Environmental Health Departments of the Local Authority.*

## **Lights**

- 4.4** All lighting should be installed and/or shielded in such a way as to direct the light to where it is required.

## **Odours**

- 4.5** Farmers should ensure that any offensive odours that might arise as a consequence of farming activities are strictly managed and minimised. *The Environmental Health Departments of the Local Authority may be consulted for advice.*

## **Containment**

### *Environmental Assessment*

- 4.6** Farmers should identify, conduct and document site specific environmental and operational risk factors for containment when a new site is established.
- 4.7** Existing sites should have Standard Operating Procedures (SOP) which are based on risks identified. These may include risk assessments that consider the impact of the following:
- Fish handling and transport
  - Failure of utility services, structures, equipment
  - Predators
  - Weather - flood, wind, snow, ice
  - Collision
  - Pollution
  - Mass stock kill event
  - Fire
  - Intruders

- 4.8** Farmers should identify and hold contact details for other relevant stakeholders sharing the same water catchment, e.g. other finfish farms, fishing interests, leisure water sports, hydro-electric production, public drinking water or other abstraction schemes.

### *Design and Construction*

- 4.9** New land-based farms should be located in areas that are unlikely to be affected by a serious flooding event based on the 100 year flood risk.
- 4.10** If the farm is in a location where it is likely to be affected, suitable flood defences should be in place to prevent the escape of any stock.
- 4.11** Land-based farms should be designed to contain fish effectively, including provision for containment during periods of flooding.
- 4.12** Farmers operating land-based aquaculture systems should have effective measures in place to prevent stock from jumping out of the holding facilities and making their way into surface waters or natural water courses.
- 4.13** All reasonable measures should be put in place to screen the water inflow to the aquaculture system to prevent the ingress of wild fish, while still allowing them to return to their natural environment.
- 4.14** Inflow systems should also be designed to prevent any upstream escape of farm stock.
- 4.15** Screen sizes and configuration should be capable of containing the entire range of fish sizes contained within the unit in every instance.
- 4.16** The farmer should be aware of the minimum fish size supplied where new stock is introduced.

*Guideline Minimum Fish Size vs Screen Size: Trout*

Minimum Fish Size (g)	Maximum Screen Size or Aperture (mm)
0.2	2
0.8	3
3	6
10	8
30+	12.5

*Guideline Minimum Fish Size vs Screen Size: Salmon*

Minimum Fish Size (g)	Maximum Screen Size or Aperture (mm)
0.2	2
0.8	3
3.0	4
10.0+	8

- 4.17** Screen integrity should be inspected daily and any necessary action taken
- 4.18** Records should be maintained of the inspection frequency of the screens and outcomes.
- 4.19** Screens should be constructed from suitably strong and robust material to ensure they are fit for purpose.
- 4.20** The water leaving a land-based aquaculture system should incorporate two screens between the fish holding unit and the outflow of a suitable size and construction to prevent the passage of fish in all potential water conditions.

- 4.21** Screening should be configured so as to enable changing of screens without any potential escape of stock.



*Note: the outflow or outfall is defined as the point where water leaves the farm and is returned to a water course.*



*Note: In general, the minimum fish size in a graded population will be 1/2 the mean weight. This figure will be much less in ungraded populations.*

### *Second-hand Equipment*

- 4.22** Farmers should have documented records for the selection, preparation and installation of second-hand tanks and associated equipment to ensure they are fit for purpose.

### *Fish Handling and Transfer*



*The risk of escape is increased during procedures such as fish input, grading, vaccination and transfer of fish within and between sites.*

- 4.23** All such procedures should be carried out to a standard operating procedure (SOP) and include planning and supervision to minimise any risk.
- 4.24** Where fish are to be handled, it is recommended that the integrity of all handling equipment be checked, including: pipelines, pumps, transport tanks, graders, counters and vaccination stations.
- 4.25** It is recommended that checks also include suitability during adverse weather conditions, where this is appropriate.

- 4.26** The use of safety nets, secondary pipe joint security devices or other forms of bunding is recommended at potential risk points, such as pipe connections.

### *Helicopter Operations*

- 4.27** Staff involved in helicopter operations should be suitably trained in the operation being undertaken and have had a safety briefing from the helicopter pilot or ground staff.

### *Failure of Containment*



Guidance on what to do in the event of an escape is available at the [Marine Scotland website](#).

- 4.28** Farmers should have site-specific contingency plans that describe actions to be taken in the event of any escapes.
- 4.29** All farm staff should be aware of factors affecting the potential breaches of containment and trained in actions to take in the event of an escape.
- 4.30** Weather permitting, and having regard to health and safety conditions, daily visual inspection of the holding units should be carried out to ensure containment of the stock.
- 4.31** Any escape, or suspected escape, of live fish should be reported immediately to all relevant stakeholders, including the relevant Producer Organisation or industry association, the local District Salmon Fisheries Board and Fisheries Trust (or at the latest, within 48 hours of discovery).
- 4.32** A decision to attempt to recapture fish and the method to be employed should be agreed with the local District Salmon Fisheries Board and Fisheries Trust and permission sought from Marine Scotland.

## 5 FISH WELFARE AND CARE

### *Veterinary Health and Biosecurity Plan*

- 5.1 In order to ensure that companies operate to the highest possible standards of welfare, all farmers should develop a documented VHP and a BP that are updated regularly.
- 5.2 Each farm should have access to a veterinary surgeon experienced in fish health to advise on fish health matters and medicine usage, and who is available to attend at short notice.

### *Fish Farm Locations*

- 5.3 The siting of farms should be such that there is an adequate supply of water of suitable quality at all times.
- 5.4 Where appropriate, there should be emergency back-up systems to maintain a high standard of water quality.
- 5.5 Sites should be located and operated in such a way as to minimise the possibility of adverse environmental conditions having an undesired effect on the fish.
- 5.6 Farmers should have written contingency plans covering actions to be taken in the event of a serious incident, such as storm damage or water quality problems. These plans should consider both the welfare of the fish and environmental protection.

### *Design and Planning of Farms, Equipment and Operating Systems*

- 5.7 The siting of tanks, ponds and raceways should be considered with a view to optimising fish welfare conditions.

- 5.8** Equipment and farm design should protect the fish from predators.
- 5.9** The design of shore bases and land-based fish farms should facilitate the control of predators and vermin.
- 5.10** Equipment should be designed in such a way as to avoid creating welfare problems for the fish and be capable of being cleaned and disinfected.
- 5.11** Farm design should be such that daily inspection of all stock is possible.
- 5.12** Farm design should allow the regular removal of moribund or dead fish as specified in the VHP.
- 5.13** Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.
- 5.14** Farmers should have access to reliable and relevant information on fish welfare.
- 5.15** Contingency plans should be in place in case of failure of the water supply or equipment which is critical to the welfare of the fish.
- 5.16** Farms and fish holding units, including inlets and outlets, should be designed in such a way as to minimise fish escapes.

### ***Water Supply and Quality***

- 5.17** The flow rate of water supplying holding facilities should be such that the fish receive sufficient water of suitable quality (especially in terms of oxygen content) to ensure that their welfare is optimised and that metabolic and other waste products are adequately removed.
- 5.18** Monitoring should be carried out to ensure that water quality parameters are maintained within the known acceptable limits for the species. The

parameters measured and the monitoring intervals will depend on the system, species, stage of development and time of year.

- 5.19** Where water quality parameters are outwith the acceptable range, steps should be taken to identify the cause and put in place remedial action as soon as possible.
- 5.20** Where appropriate, automatic equipment fitted with alarms should be used to monitor water quality.
- 5.21** Where the welfare of the fish is critically dependent on air/oxygen supply or pumped water, automatic oxygen and water level monitoring equipment should be used.
- 5.22** Aeration/oxygenation/water level monitoring equipment should be fitted with alarms and backup systems which are tested daily.
- 5.23** Automatic and emergency back up and monitoring equipment should be routinely inspected, calibrated and serviced in accordance with manufacturer's recommendations.
- 5.24** Farmers should be familiar with water quality parameters for their stock and be able to recognise visual and behavioural indicators of inadequate water quality.

### ***Light***

- 5.25** Levels of light to which fish are exposed should be appropriate to the species and stage of development.
- 5.26** Lighting which is optimal for fish welfare should be determined on a site by site basis using practical experience, research and specialist advice.

**5.27** Fish species which are sensitive to high ambient light levels or ultraviolet light should be kept suitably shaded or otherwise protected.

**5.28** Sudden changes in light levels should be avoided wherever possible.

### ***Inspection and Testing***

**5.29** Weather permitting, and having regard to health and safety conditions, all equipment should be visually inspected daily.

**5.30** Any defect should be immediately recorded and reported to supervisors.

**5.31** All defects should be immediately rectified and, where this is not possible, alternative measures put in place to safeguard fish welfare.

### ***Predator Control***

**5.32** Farmers should have standard operating procedures to prevent and manage predation problems.

**5.33** Farmers should document sightings of predators in the vicinity of farms.

### ***Birds***

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*Birds may only be killed or taken if a licence has been issued by Scottish Government and the conditions specified in the licence must be followed. The conditions specified in the licence are as follows:*

- The specified method for killing birds must be followed;*
- The specified maximum number of birds to be killed must not be exceeded;*
- Documented records of birds killed must be kept;*
- When it is permissible by law to shoot a bird, it may only be done by a proficient named person, using an appropriate firearm and ammunition;*

- 5.34** Birds should be excluded by deploying permitted measures such as nets, strings, scarecrows and other systems designed for the purpose.

#### *Otters*

- 5.35** Equipment should be deployed in such a manner as to reduce the likelihood of access by otters.

#### *Mink*

- 5.36** Equipment should be deployed in such a manner as to reduce the likelihood of access by mink.
- 5.37** Well maintained and secure cage nets and top nets with a top net mesh of less than 3 inches should be employed in an effort to deter mink.

#### *Record-keeping*

- 5.38** Records of losses to predators and use of predator control systems should be maintained.

### ***Stockmanship and Husbandry***

- 5.39** Farmers should be able to recognise indicators of reduced welfare in fish, including abnormal behaviour, physical injury and symptoms of disease, and take remedial action in the event that such indicators are apparent.

### ***Handling Live or Conscious Fish***

- 5.40** Live fish should only be removed from water and handled when absolutely necessary.
- 5.41** If fish are handled, adequate support should be given to the body - live fish should never be held by the gills or tail only.

- 5.42** Different species have different tolerance to being out of water, but the time out of water should never be so long as to produce signs of distress.
- 5.43** Even for tolerant species the time out of water should be as short as possible when the air temperature is particularly high or low.
- 5.44** In all cases, fish should be kept wet, except where blotting dry is essential to avoid contamination of gametes during stripping.
- 5.45** Where pumps, pipes and grading equipment are used, these should be properly designed and correctly set up so that they do not injure or unnecessarily stress fish.

#### *Hand Nets*

- 5.46** When hand nets are used they should be of suitable proportions – physical size and mesh size.
- 5.47** When hand nets are used they should be designed and constructed to minimise physical damage to fish.
- 5.48** When hand nets are used they should be kept clean, disinfected and in good repair.

#### ***Assessing Suitability for Transfer to Sea***

- 5.49** Prior to the transfer of juvenile Atlantic salmon to sea, the degree of smoltification in the population should be monitored for several weeks before the expected transfer date, so that the optimal time for transfer can be identified.
- 5.50** Farmers should assess smoltification of fish using an ATPase or salt water tolerance test before allowing release to sea.

- 5.51** Fish should not be exposed to salt concentrations greater than 35 ppt.
- 5.52** *Salt water tolerance tests can be aversive in non-smolting fish.* Farmers should immediately kill any moribund fish and terminate the test if fish begin to show signs of distress.
- 5.53** Farmers should be trained in the procedures for assessing smoltification and in minimising any negative effects on the welfare of the fish.
- 5.54** The principles of assessing smoltification should be incorporated in the VHP and BP for other salmonids to be transferred from fresh to sea water.

### ***Crowding***

- 5.55** A written procedure for crowding of fish should be prepared.
- 5.56** Personnel should be trained in the appropriate techniques.
- 5.57** The frequency and duration of crowding should be kept to the minimum.
- 5.58** Farmers should monitor fish behaviour during crowding and take action if fish show signs of stress or damage.
- 5.59** Farmers should remove and cull any moribund or damaged fish.
- 5.60** Farmers should ensure that enclosure nets and screens are kept clean in order to avoid water quality problems during crowding.
- 5.61** Farmers should monitor oxygen levels during crowding and take corrective action if levels fall below a critical point for that species (the critical point will vary between species and with environmental factors).

## ***Removal and Disposal of Dead and Moribund Fish***

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*Disposal of dead fish is the subject of EU, UK and Scottish legislation.*

- 5.62** Fish should be inspected daily and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure.
- 5.63** Where problems are identified during an inspection, prompt remedial action should be taken in accordance with the VHP and BP to determine the cause and deal with the problem, including where appropriate consultation with a veterinary surgeon or fish health specialist.
- 5.64** Records should be kept of each inspection, which include the number of dead fish removed and the likely cause of death, as determined by a competent person.

### ***Marking***

- 5.65** Marking methods that cause significant distress or injury to farmed fish should not be used.

### ***Withholding Feed***

- 5.66** Before transport or harvest, feed should be withheld to reduce metabolic rate and the excretion of waste products and to eliminate the presence of food and/or faecal material in the gut at harvest, thus minimising the risk of microbiological contamination during processing.
- 5.67** The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting should be appropriate to the species and temperature.

- 5.68** Complete withdrawal of food should not be used as a means of conditioning fish prior to harvest.
- 5.69** *Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases (e.g. pancreas disease of Atlantic salmon). Veterinary advice should be sought on this with, as appropriate, feed withdrawal protocols being included in the VHP and BP.*

### **Stocking Density**

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*As a general rule, stocking density may be adjusted in line with the biological and behavioural needs of fish having regard to the prevailing environmental conditions and, in particular, water quality. The farming system in which the fish are held and the ability to maintain high standards of water quality are important defining factors in determining optimum stocking density.*

- 5.70** Stocking density should be monitored in relation to health, fish behaviour and water quality to ensure that fish welfare is not compromised.
- 5.71** Immediate attention should be given to any problems that arise.

### **Grading**

- 5.72** The avoidance of injury and stress to fish should be a primary consideration when deciding on the method of grading to be employed.
- 5.73** Grading equipment should be designed and maintained so as not to damage the fish.
- 5.74** Details of planned frequency and procedures for grading should be part of the VHP and BP.

## ***Transport of Live Fish***

- 5.75** Crowding of fish before collection for transport should be kept to a minimum.
- 5.76** Fish should be transported in such a way that possible adverse effects on their welfare are minimised.
- 5.77** Biosecurity and fish welfare should be considered before transporting fish populations.
- 5.78** For transport, oxygen monitoring should be carried out with sufficiently frequent monitoring intervals to ensure that oxygen levels remain within safe limits at all times.
- 5.79** Control systems for oxygenation of water should be such that adjustments may be made timeously.
- 5.80** Supplementary oxygen or air supply should be sufficient to last longer than the anticipated length of the journey, including helicopter transport.
- 5.81** Excessive or rapid changes in water temperature or pH in transport tanks should be avoided.
- 5.82** Any fish that die during transportation should be separated from live fish as soon as possible after arrival and the cause of death determined by a competent person.
- 5.83** Transport water should not be discharged *en route* directly into natural water courses.

## ***Harvesting and Culling***

- 5.84** Fish should be fasted for the minimum period necessary to clear the gut of feed and faeces.

- 5.85** Crowding fish prior to harvesting should be for the minimum time possible, especially where more than one crowding session is necessary to complete the harvest.
- 5.86** Killing efficiency should be monitored by a proficient person to ensure fish do not regain consciousness prior to death.
- 5.87** Arrangements for emergency culling should be addressed in the VHP and BP.

## **6 FEED AND FEEDING**



*Fish feed manufacturing is a specialist sector of the feed manufacturing industry fish. Farmers will therefore generally source their feed through specialist commercial suppliers, who must operate within the relevant feed legislation and strict regulatory controls. That situation is therefore reflected in this section of the CoGP.*

### ***Feed Formulation***

- 6.1** Farmers should ensure, through labelling information or documentary assurance, that they use feeds that have been formulated for the species and life stage of fish being grown.

### ***Use of Feed***

- 6.2** Farmers should have a written feed management plan, which includes the following points:
- 6.2.1 Feeding the correct feed size;
  - 6.2.2 Feeding the correct amount of feed to any population of fish, in the proper manner and over the correct period(s) of the day;

- 6.2.3 Regular monitoring of feed conversion efficiency (following sample weighing), and assessment of whether feeding protocols and guidelines to assist farm personnel are effective.
- 6.3 The use of 'feedback loop' feeding systems should be considered, since these improve conversion efficiency, reduce environmental impact, and generally ensure that finfish feed is used as efficiently as possible.
- 6.4 Untreated raw fish should not be used as a feeding stuff for fish in freshwater tanks, ponds and raceways.
- 6.5 Where whole fish or parts of fish form part of the diet, they should be pasteurised, irradiated or otherwise processed to ensure that they are microbiologically safe.

**\*\*\* END \*\*\***