



Humane Farm Animal Care
Welfare Standards

FARMED
ATLANTIC SALMON
Edition 24

FARMED ATLANTIC SALMON

HUMANE FARM ANIMAL CARE

Humane Farm Animal Care is a 501(c)3 non-profit organization whose mission is to improve the lives of farm animals being raised for food and to assure consumers that certified products meet our welfare standards.

Our initial set of standards were adapted from the RSPCA Assured program published by Royal Society for the Prevention of Cruelty to Animals in the United Kingdom. Since then, the Humane Farm Animal Care standards have been refined to provide standards for the rearing, handling, transport, and slaughter of food animals (along with Chain of Custody management for further processed products) under the Certified Humane® program and now applicable worldwide. These dynamic documents are always informed and kept updated based on scientific research*, veterinary advice, and the practical experience of the farming industry.

Animal welfare is improved when livestock managers adhere to the following:

- Access to wholesome and nutritious feed
- Appropriate environmental design
- Caring and responsible planning and management
- Skilled, knowledgeable, and conscientious animal care
- Considerate handling, transport, and slaughter

****HUMANE FARM ANIMAL CARE'S SCIENTIFIC COMMITTEE***

Since the introduction of the Certified Humane® program in 2003, leading animal scientist, veterinarians, and producers have worked tirelessly with Humane Farm Animal Care not only to develop but continually update all the Animal Care Standards as advancements in science dictate. An up-to-date listing of these industry notables (our essential partners) is always available on our website at: <https://certifiedhumane.org/scientific-committee/>

TABLE OF CONTENTS

PART 1: INTRODUCTION	1
A. The Certified Humane® Label	1
B. Guide to the Use of the Welfare Standard	1
PART 2: FEEDING	2
A. Feed	2
F 1: Wholesome, nutritious feed.....	2
F 2: Free access to feed.....	2
F 3: Feed records	2
F 4: Substances prohibited in feed.....	2
F 5: Provision of feed	2
F 6: Avoiding changes in feed	3
F 7: Clean feeding equipment.....	3
F 8: Fasting	3
PART 3: ENVIRONMENT	4
A. Equipment.....	4
E 1: Environment for fish	4
E 2: Tanks	4
E 3: Maintenance of enclosures and netting	4
B. Environmental Quality.....	5
E 4: External water quality (freshwater and seawater)	5
E 5: Contingency plan in recirculation systems	5
E 6: Lighting.....	5
E 7: Sufficient light in sites	5
C. Environmental Impact.....	6
E 8: Environmental Impact Plan.....	6
E 9: Environmental Regulations.....	6
E 10: Environmental impact	6
E 11: Escapees	6
E 12: Extraneous species	6
E 13: Fallowing.....	6
E 14: Aesthetic.....	6
PART 4: PRODUCTION STAGES	7
A. Freshwater (Pre-Smoltification) / Juvenile Fish.....	7
PS 1: Eggs and juvenile fish	7
PS 2: Supply water.....	8
PS 3: Freshwater stocking density.....	8
PS 4: Water quality parameters	8
PS 5: Ova	8
PS 6: Hatchery	9
PS 7: Multi-level hatchery systems	9
PS 8: Alevins	10
PS 9: Fry	10
PS 10: Parr	10
PS 11: Smoltification.....	10
B. Post Smolt	11

PS 12: Post smolt sites	11
C. Seawater	11
PS 13: Seawater stocking density	11
PART 5: MANAGEMENT	13
A. Managers and Stock-keeper Training.....	13
M 1: Understanding the standards	13
M 2: Training.....	13
M 3: Emergency management	13
B. Inspection and Records	14
M 4: Operations records	14
M 5: Monitoring fish	14
M 6: Dead/moribund fish.....	15
M 7: Equipment	15
M 8: Complaints to Operators	15
PART 6: HEALTH AND HUSBANDRY PRACTICES	16
A. Health Care Practices.....	16
HH 1: Veterinary Health and Welfare Plan (VHWP)	16
HH 2: Notifiable diseases	16
HH 3: Preventing injuries	16
HH 4: Care of sick and injured animals.....	16
HH 5: Casualty slaughter.....	17
HH 6: Biosecurity	17
B. Handling.....	17
HH 7: Handling.....	17
HH 8: Pumps / Pipes / Hand nets.....	17
C. Treatment and Vaccination	18
HH 9: Injection procedures.....	18
HH 10: Anesthesia procedure	18
HH 11: Treatments	19
HH 12: Freshwater vaccination	19
HH 13: Freshwater automated vaccination.....	19
D. Mortality, Mutilations, Genetic Selection	20
HH 14: Mortality recording and reporting.....	20
HH 15: Mutilations	20
HH 16: Generic selection and modification	20
E. Grading/Crowding at Freshwater Enclosures and Seawater Sites	21
HH 17: Grading plan	21
HH 18: Grading equipment	21
HH 19: Grading process	22
HH 20: Monitoring	22
HH 21: Oxygen levels	22
HH 22: Passive grading	22
HH 23: Manual grading.....	22
HH 24: Wellboat grading.....	23
HH 25: Pushing / towing enclosures	24
F. Sea Lice	24

HH 26: Sea lice	24
G. Protection from Other Animals	25
HH 27: Precautions and protection from other animals	25
HH 28: Wild animals in enclosure nets	25
HH 29: Predator-proof nets	25
HH 30: Acoustic Devices	25
PART 7: TRANSPORTATION	26
A. General Transport	26
T 1: Transport suppliers allowed	26
T 2: Training and awareness of welfare	26
T 3: Planning and communication	26
T 4: Handling	26
T 5: Water quality	27
B. Site Staff Responsible for Moving Fish.....	27
T 6: Transport plan	27
T 7: Fish fit for transport	27
T 8: Monitoring and records	27
T 9: Fasting	27
T 10: Bath treatments.....	28
T 11: Nets for transport.....	28
C. Transport Staff	28
T 12: Equipment inspection.....	28
T 13: Management of oxygen, water temperature and pH	28
T 14 Records of dead or injured fish	28
T 15 Cleaning and disinfection.....	29
D. Fry Transport	29
T 16: Fry transport.....	29
E. Road Transport.....	29
T 17: Driver’s responsibilities	29
T 18: Transport tanks and openings.....	29
T 19: Stocking density and water quality	30
T 20: Ferries.....	30
T 21: Unloading.....	30
F. Helicopter Transfer	30
T 22: Staff involved.....	30
T 23: Preparations.....	31
T 24: Loading	31
T 25: Unloading.....	31
G. Wellboat Transport (Smolts) and Seawater Site Staff (Receiving)....	31
T 26: Requirements for wellboats and planning.....	31
T 27: Competent staff	32
T 28: Stocking density and fish counting equipment	32
T 29: Pumps, pipes and discharge	32
T 30: Records of mortality.....	32
H. Harvest Wellboats.....	33
T 31: Requirements for wellboats and planning.....	33

T 32: Competent staff	33
T 33: Wellboat equipments and systems	33
T 34: Stocking density	34
T 35: Water parameters	34
T 36: Harvesting activities and records	34
I. Cage Side Harvest	35
T 37: Wellboats cleaning and disinfection	35
T 38: Equipment	35
T 39: Waste materials	35
T 40: Competent staff	35
T 41: Record keeping	36
PART 8: STUNNING AND SLAUGHTER	37
A. Pre Slaughter	37
S 1: Holding Pens	37
S 2: Competent staff	37
S 3: Water quality in the pipes	38
B. Stunning Followed by Bleeding	38
S 4: Stunner tests	38
S 5: Stunning equipment	38
S 6: Effectiveness of electrical stunning	38
S 7: Effectiveness of the stun	39
C. Slaughter / Killing Including Cage-Side Harvest	39
S 8: Slaughter / Killing	39
References	40

PART 1: INTRODUCTION

A. The Certified Humane® Label

The Certified Humane® program was developed to certify products derived from animals raised on farms that adhere to these standards. Upon satisfactory completion of the application and inspection process, farmers and ranchers are certified and given authorization to use the Certified Humane® trademarked logo. Program participants are inspected and monitored by Humane Farm Animal Care annually. Charges levied are to cover inspections and program costs.

Humane Farm Animal Care expects their certified farmers, ranchers and producers to adhere to all regional or national regulations governing husbandry, food production and environmental management as well as the Certified Humane® standards. If at times there is a conflict, the relevant rules set by the local or national authority will take precedence.

B. Guide to the Use of the Welfare Standard

- The broad objectives of the standard are described at the beginning of each section.
- The numbered requirements are the standards. Compliance with all the standards is mandatory, except where a standard is deemed not applicable (these standards are written to cover facilities in varying geographic and temperate regions, and facilities using different systems; therefore, not all sections in these standards will apply to each facility).
- Boxed sections provide additional information or may highlight areas where the standards will be reviewed in the future.
- At minimum, HFAC requires compliance with any local, state, provincial, or national regulations for salmon production that affect the environment or safety of their product, as well as the veterinary protocols for their jurisdiction. Producers must meet both HFAC standards and the above regulations. If there is any overlap, the more stringent rule must be followed.

PART 2: FEEDING

OBJECTIVES: Fish need to have freedom from hunger and malnutrition by ready access to a high-quality diet that is appropriate to their species and allows full health to be maintained. Feed needs to be distributed in such a way that fish can eat without undue competition.

A. Feed

F 1: Wholesome, nutritious feed

- a. Fish must be fed a wholesome diet that is:
 1. Appropriate for their species, age, and stage of production;
 2. Fed in sufficient quantity to maintain good health; and
 3. Formulated or assessed to satisfy their nutritional
- b. All feed must be manufactured from constituents that are free from active parasites and known fish pathogens and contamination.
- c. Managers must be aware of nutrient deficiencies and excesses on sites (freshwater and sea) and correct these as appropriate.

F 2: Free access to feed

Fish must have free access to nutritious feed each day, except when directed otherwise by an attending veterinarian.

F 3: Feed records

- a. Producers must have written records and/or labels of the feed constituents, the inclusion rate and constituents of compound feeds, and feed supplements, including those records from the feed mill or supplier.
- b. Feed records must be retained for at least one year.
- c. Feed records must be available to the Humane Farm Animal Care Inspector during the inspection and upon request.

F 4: Substances prohibited in feed

- a. No feedstuffs containing growth regulators or hormones are permitted.
- b. The use of veterinary medicinal products in fish feed is prohibited, except for essential therapeutic use (a disease outbreak or where welfare will otherwise be compromised as advised by a veterinary).
- c. All feeds must be produced in accordance with all relevant legislation.

F 5: Provision of feed

- a. Feed must be dispensed and distributed in a way that fish can eat without undue competition.
- b. Fish must be observed at least once a day during feeding.
- c. Fish on the periphery of the tank or enclosure must receive adequate amounts of feed.
- d. Stale or moldy feed must not be provided to fish.

Feedback systems to prevent overfeeding are encouraged in seawater enclosures.

F 6: Avoiding changes in feed

Efforts must be made to avoid sudden changes in the type and quantity of feed, except under the direction of a veterinarian.

F 7: Clean feeding equipment

- a. Manual or automatic systems must be kept clean.
- b. Feeding equipment must be designed, constructed, placed, and maintained so that contamination of the feed is minimized.
- c. Automatic feed delivery systems must be maintained in good working order.

F 8: Fasting

- a. For harvest fish, fasting period until the slaughter must not exceed 120 hours or 50-degree days, whichever comes first.
- b. Fasting protocol must be written in the VHWP (see HH 1).
- c. After any period of fasting, feed must be reintroduced to:
 1. encourage the fish to resume feeding;
 2. minimize waste;
 3. allow easy access to feed and prevent undue competition.
- d. Records must be kept of the period for which the fish were fasted and when feed was reintroduced.

Although salmon may not feed for long periods in the wild, fasting a farmed fish that as previously been fed regularly will usually have an adverse effect on its welfare. It is unacceptable to deprive salmon from feeding for perceived flesh quality purposes.

PART 3: ENVIRONMENT

OBJECTIVES: The environment, including all the infrastructure, in which fish are kept must support their welfare needs, be designed to protect them from fear, distress, and physical or physiological discomfort, distress and injury, and allow them to perform natural behaviors. The farm needs to be operated with respect for the natural environment and employees need to recognize their duty to care for the wider environment. All reasonable steps need to be taken to minimize the ecological impact of the farming system.

A. Equipment

Where management systems, designs, or layout of infrastructures not covered in the HFAC Animal Care Standards are being employed or considered, these must be referred to and discussed with the HFAC staff before they can be considered for certification.

E 1: Environment for fish

The tanks, sited normally in land with fresh water, and enclosures, which usually are sited in the sea, must be considerate to fish welfare, personnel safety and minimize adverse effects to the environment.

E 2: Tanks

- a. Tanks must be designed, constructed, sited and maintained free from sharp edges and protrusions that may injure the fish.
- b. Inlets and outlets must prevent fish escape and ingress of wild animals.
- c. Lids, covers, barriers or nettings must be placed over the tanks to prevent fish escaping.
- d. If nets are used, they must be of a suitable size to prevent escaping and entangling of fish in the tank.
- e. All tanks must have individual nets for removing dead or moribund fish.
- f. Water flow rate must be suitable for fish to hold their position in the water column.
- g. Tanks over five meters in diameter must be fitted with oxygen and water level alarms.

E 3: Maintenance of enclosures and netting

- a. The location of enclosures in the sea must allow an adequate flow of clean water.
- b. Enclosures in the sea must be protected from extreme climate conditions that may damage them.
- c. The water current must not be too strong that prevents fish to hold their position in the water column.
- d. They must be easily accessed from the shore for daily inspections.
- e. Enclosures must have a minimum depth of 5 meters.
- f. Netting used in the enclosure construction must be smooth and provide a non-abrasive surface to prevent injuries to the snout, fins and scales of fish.
- g. Biofouling must not be allowed to build up on the enclosure nets.

- h. Enclosure nets must be regularly checked for holes and fouling and maintained accordingly.
- i. Nets must be adequately tensioned and weighted to prevent distortion.

Properly tensioned netting is important to ensure that the full area of the pen is available to maintain the stocking density, and to act as a deterrent to predators.

- j. Net cleaning process must not compromise the welfare of the fish from either use of the equipment itself, or from the dirt/detritus that is released because of the cleaning.
- k. Frequency of net cleaning should be increased to mitigate the size and quantity of potential detritus.

B. Environmental Quality

E 4: External water quality (freshwater and seawater)

- a. Water quality composition must be monitored frequently, if necessary daily, depending on the system, time of year and lifecycle stage of stock.
- b. Water quality assessment procedure must be detailed in the Veterinary Health and Welfare Plan (see HH 1).
- c. If water quality departs from the acceptable range, immediate action must be taken to identify the problems and rectify the situation promptly.
- d. Deterioration of water quality due to fouled nets or over feeding must be avoided.

E 5: Contingency plan in recirculation systems

A contingency plan must be in place for recirculation systems to detail the course of action to be undertaken should unexpected issues arise.

E 6: Lighting

- a. Lighting provides to fish must be maintained at a level suitable for each stage of development.
- b. Fish must be protected from distress caused by high levels of UV light or sudden changes in lighting levels.
- c. Tank must be uncovered before transferring fish to sea to habituate them to brighter light.
- d. Enclosures must be of adequate depth (minimum of 5 m) to prevent damage from ultraviolet radiation.

E 7: Sufficient light in sites

Adequate lighting must be available at any time for use when inspecting fish and equipment.

C. Environmental Impact

E 8: Environmental Impact Plan

Develop and implement a written Environmental Impact Plan applicable to the site or the to the region, which must be updated accordingly compliant to local regulation.

E 9: Environmental Regulations

- a. All relevant legislation, official guidelines and Codes of Practice must be strictly adhered to and understood.
- b. Review environmental protection policies as developments in research and technology allow for.

E 10: Environmental impact

- a. The potential for therapeutic agents to affect the environment, both locally and more widely, must be given full consideration, and all relevant legislation must be adhered to.
- b. All farms must have a written pharmaceutical waste policy.

E 11: Escapees

Fish farms must have a site-specific containment plan in place for preventing fish escaping and for recapturing them.

Farmed fish which escape may have an adverse ecological impact and are also likely to experience welfare problems. It is therefore essential that all possible reasonable measures are being taken to prevent farmed fish escaping.

E 12: Extraneous species

Extraneous species must be treated in accordance with the relevant legislation and local regulations.

E 13: Fallowing

Enclosures must be fallowed as detailed in the Environmental Impact Plan to allow recovery of the benthos and help to reduce sea lice populations.

E 14: Aesthetic

Sites must be kept tidy and all waste must be disposed of by an approved method; burning of plastics is prohibited.

PART 4: PRODUCTION STAGES

OBJECTIVES: The freshwater phase of the Atlantic salmon lifecycle involves several separate stages, ranging from the egg through to the fully smolted fish, where each requires detailed standards to ensure the welfare of the fish. These standards also need to ensure that the fish are fully prepared for the seawater phase of their lives.

The seawater stage of the salmon lifecycle contains several critical control points (CCPs), such as wellboat transportation to harvest. These standards are designed to address these CCPs to ensure that the welfare of the fish is not compromised during the seawater-based processes.

A. Freshwater (Pre-Smoltification) / Juvenile Fish

These standards relate to both re-circulation and flow through systems and the following definitions apply:

- ***Ova – Eyed eggs*** - Eggs that have reached the stage of development where the black spot of the eye is clearly visible. Approximately from 220 to 250 degree days post-spawn.
- ***Alevins*** - Hatched eggs not yet ready for first feeding.
- ***Fry*** - Starting from first feeding up to 1 gram.
- ***Parr*** - Greater than 1 gram and up to the start of smoltification.
- ***Pre-smolt*** - The final production period when fish undergo smoltification from parr to smolt.
- ***Smolts*** - Fully smolted.

There are areas of ongoing research which are designed to add to our knowledge about the welfare of the eggs and the fish at this stage of their lifecycle. If any new scientific evidence emanating from this research is shown to have a positive effect on the welfare of the eggs and fish involved, HFAC will seek to incorporate this information into the standards. Some of this research may challenge what is at present deemed to be established practice. For example, if it is concluded that the production of a certain type of smolt is detrimental to fish welfare, HFAC will not permit its production as a part of HFAC welfare standards. HFAC is seeking for ongoing scientific evidence to base the development of standards for broodstock fish for inclusion in future editions.

PS 1: Eggs and juvenile fish

- a. Eggs and juvenile fish must be produced either in-house or obtained from another Certified Humane approved supplier.
- b. All eggs must be tested for fish pathogens as required under the relevant legislation.
- c. Eggs and juvenile fish supplied by third parties must be accompanied by full health documentation and records of the parent stock, as well as the eggs and juvenile fish themselves.

PS 2: Supply water

Supply water must:

- a. Be of high quality (see PS 4);
- b. Be frequently tested for quality parameters;
- c. If necessary, be filtered or treated with ultraviolet radiation.

PS 3: Freshwater stocking density

- a. The following maximum stocking densities must not be exceeded:
 1. Hatchery - 15,000 eggs per California basket/tray
 2. Multi-level - 20,000 eggs per tray
 3. First feeding tank - 10,000/m²
 4. Freshwater production tank:

Liveweight (mean)	Stocking density (kg/m ³)
Up to 1 gm	10
> 1 – 5 gm	20
> 5 – 30	30
> 30 – 50	50
> 50	60

- b. The site stocking plan must demonstrate that the facilities can maintain and service the requirements of the stocking densities as define above.

PS 4: Water quality parameters

- a. The following water quality parameters must be complied with:

Parameter	Ova	Alevins	Fry	Parr/Smolt
Min Oxygen (O ₂) mg/l	7.0	7.0	7.0	7.0
Oxygen (O ₂) saturation in % exit water	> 90.0	> 70.0	> 70.0	> 70.0
Free Ammonia (NH ₃) mg/l	< 0.025	< 0.025	< 0.025	< 0.025
Carbon dioxide (CO ₂) mg/l	< 6	< 6	< 15	< 15
Max temp °C	8.0	10.0	14.0	n/a
pH in the inlet water	5.5 to 8.0	5.5 to 8.0	5.5 to 8.0	5.5 to 8.0
Nitrite mg/l *	< 0.1	< 0.1	< 0.1	< 0.1
Nitrate mg/l **	n/a	< 50.0	< 150.0	< 150.0
Total Suspended Solids (Turbidity)	<15 mg/l	<15 mg/l	<15 mg/l	< 15 mg/l

* Not applicable to flow through systems

** HFAC acknowledges that for fully functioning recirculation systems nitrate levels are above 50 mg/l

- b. Water management must prevent super-saturation.
- c. Water constituents (e.g. minerals) may be added to the fish environment to achieve the ideal water quality parameters.
- d. Records for water quality parameters and treatment must be available to the Humane Farm Animal Care Inspector during the inspection and upon request.

PS 5: Ova

- a. Shocking onto a dry surface is prohibited.
- b. The hatching environment must minimize movement of the eggs.
- c. All eggs must be disinfected prior to entry to any new facility.
- d. Eggs must be water-hardened before being exposed to disinfectant or transportation.
- e. Eggs being transported must be carried with twice the volume of water than eggs.

- f. Water flow and incubator design must be such that ‘dead spots’ within the incubator do not occur, i.e. it must be sufficient to provide oxygen and remove waste products.
- g. Eggs must be placed into the hatching environment to ensure maximum survival rates and be accessible for picking; records for survival rates must be available.
- h. The transportation of eyed eggs must be done using purpose-built boxes.
- i. Eyed eggs must not be transported at a depth greater than 4cm.
- j. After placement, green eggs must remain undisturbed (other than for picking) for 250-degree days and must not be shocked before 250-degree days or after 370-degree days.
- k. Where picking is practiced, dead/unviable eggs must be removed as needed, but with minimum disturbance.
- l. Regular inspections must be made to ensure the earliest detection of fungal infections.

PS 6: Hatchery

- a. All equipment used in this phase must be:
 - 1. maintained in full working order;
 - 2. serviced and repaired as required.
- b. Records must be kept of equipment services.
- c. At a minimum there must be an alarm for dissolved oxygen and water level.
- d. All alarms must be checked weekly and records kept.
- e. There must be a screen to prevent the blocking of inlet valves that must be checked at least daily.
- f. Hatching environment must be hygienic and free from any rough edges that could cause damage to the eggs.
- g. Where multi-layer systems such as buckets are used, water hygiene and the integrity of the eggs must be maintained.
- h. There must be no cross contamination of water from one container to another.
- i. The shocking method must be identified and must not be such that it causes excessive mortalities.
- j. Training records must be available which identify those who are competent to perform shocking.
- k. A suitable tray substrate must be in place before hatching.

To maintain moisture levels, ice may be placed above the eggs to cool water and drip it through.

PS 7: Multi-level hatchery systems

- a. The maximum stocking density in each tray must not exceed 20,000 eggs per tray (tray size 55 x 53 cm approx.) with eggs no more than three tiers deep.
- b. Each tray must have its own water supply.
- c. Trays must be easily accessible to perform tasks such as removing the dead eggs without disturbing the other trays.
- d. The flow in each tray must be visible and/or measurable and must be monitored to ensure maximum survival of the eggs; records for survival rates must be available.
- e. If intending to stock above 15,000, records from the previous year must indicate that mortality levels are below 5%.

PS 8: Alevins

- a. The hatching substrate must provide a secure environment for the alevins without encouraging bunching.
- b. All alevins must be inspected daily, and any dead ones removed.
- c. The siphoning of alevins is allowed, but nets must not be used to transfer them when they weigh under 0.5 grams.
- d. A lighting program must be available and no abrupt changes in light levels must be carried out.
- e. Where water temperature manipulation is practiced, fluctuation in temperature and temperature gradient must be kept to a minimum.
- f. Feeding must start no later than when 90% of the alevins have lost their yolk sac.

PS 9: Fry

- a. Fish must have access to sufficient feed to maintain them in full health and vigor.
 - 1. Feed must be provided to satiate the fish and spread at regular intervals daily.
- b. Light levels must be such that they allow all fish in the water column to visualize the feed at all times.

HFAC is investigating whether supplying a dark period is of benefit to the welfare of the fish.

- c. The load of suspended solids must allow visibility to the bottom of the tank.
- d. The water depth must be appropriate to the tank for optimum water quality levels.
- e. As the fish leave the bottom of the tank, water depth must be adjusted to allow natural behavior.

PS 10: Parr

- a. The water temperature must not be above 16°C, unless required by a veterinary.
- b. Feed withdrawal period prior to grading must not exceed 48 hours.
- c. Parr must only be crowded for a maximum of two hours and any procedure that leads to crowding must be recorded.
- d. Grading must only start when most fish weigh a minimum of 1.3 grams.
- e. The grader must be suitable for the size and type of fish.
- f. When dealing with more than individual fish below 5 grams in weight that require culling, they must be put into an anesthetic mixture as prescribed by the attending veterinarian; record must be kept.

PS 11: Smoltification

- a. All fish must be fully smolted before following to the next production phase.
- b. The smoltification process (silvering, swim pattern, shape) must be monitored during the period and records kept (see HH 1).
- c. The weekly ATPase test records from the current and the last cycle must be available for the auditor.
- d. The use of hypertonic water (water above 35 parts/1000) for smolt survival testing is prohibited.

As a guide, HFAC recommends the use of the following smolt scoring system

Score	Appearance
1	<i>Parr marks clear, light-colored back, flanks green, belly yellow, no silvering.</i>
2	<i>Parr marks fading, back and fins light, flanks starting to silver, belly yellow.</i>
3	<i>Parr marks faint, back and fins darkening, flanks silver, belly whitening.</i>
4	<i>Parr marks very faint, dark back, yellow only around fin bases and operculum, flanks silver.</i>
5	<i>Parr marks gone, back dark, dark margin to fin edges, flanks silver, belly white, silvering color dominant.</i>

B. Post Smolt

PS 12: Post smolt sites

- a. All fish arriving at these facilities must be fully smoltified, according to PS 11.
- b. Supply water must:
 1. be of high quality;
 2. if necessary, be filtered or treated with ultraviolet radiation.
- c. Grading procedures are not allowed after the arrival of the fish into the sites.
- d. All handling procedures must be kept at minimum.
- e. Handling fish twice or more within 24 hours is not allowed.
- f. Maximum stocking density must not exceed 60 kg/m³.
- g. Vaccination is not recommended but, if carried out, must follow all indications described for vaccination.
- h. Tanks over five meters in diameter must have oxygen and/or water level alarms fitted.
- i. Flow and/or oxygen alarms must be fitted to all water intakes of the rearing units.
- j. All alarms must be checked weekly, and records kept.
- k. Where the level of fish mortality exceeds 1,5 % weekly this must be recorded and reported to Certified humane within 72 hours.
- l. Mortality must be removed from the tanks one time per day as minimum.

C. Seawater

PS 13: Seawater stocking density

All fish must be sourced from a Certified Humane approved population, including any fish that may have spent part of its life on another freshwater site prior to transfer to the present site.

- a. The following maximum stocking densities must not be exceeded:
 1. Seawater enclosure: 17 kg/m³
 2. Seawater enclosure site maximum: 15 kg/m³
- b. The maximum stocking density must be calculated on the weight of fish/m³ of water volume.
- c. The depth of the net must be such that there is a gap of at least 5 meters from the base of the net to the seabed.
- d. Whichever net design is being used, the proportion of the cone which is included in stocking density calculations must permit a minimum of a 5 meters diameter swim

circle. This includes all types of coned net: circle with coned base, square with coned base and fully coned nets.

PART 5: MANAGEMENT

OBJECTIVES: A high degree of caring and responsible management is vital to good animal welfare. Managers and caretakers for both fresh water or sea water facilities must be thoroughly trained, skilled and competent in animal husbandry and HFAC Animal Care Standards.

A. Managers and Stock-keeper Training

M 1: Understanding the standards

Managers must ensure that:

- a. All personnel involved in husbandry practices have access to a copy of the current *Animal Care Standards for Farmed Salmon*;
- b. They and all personnel involved in husbandry practices are familiar with the standards and apply their content.

M 2: Training

- a. Site managers must:
 1. be able to demonstrate that staff with responsibility for animal care are trained and competent in aspects of fish husbandry and welfare, relevant to their duties. When deficiencies are noted, managers must provide appropriate training to ensure that all stock-keepers have the required skills;
 2. make sure that all third-party staff being used for the husbandry, handling, procedures and process on sites (i.e., crowding, harvesting, treating, vaccination, transportation) have proper training to ensure fish welfare.
- b. Written records of managers and staff training (including third-party staff) must be maintained.
- c. Stock-keepers and all personnel involved in husbandry practices must be able to:
 1. demonstrate their proficiency in procedures that have the potential to cause pain or distress including netting or other handling, crowding and euthanasia;
 2. recognize indicators of poor welfare in fish including abnormal behavior, physical injury and symptoms of disease;
 3. understand the needs of the fish and be aware of any risks involved and the procedures to address those risks;
 4. recognize visual indicators of poor fish water quality (e.g. gasping, increased aggression);
 5. recognize fish behavioral indicators of poor water quality or any other abnormal behavior.
- d. An adequate number of experienced staff must be available to deal sufficiently quickly with any problems that arise.

M 3: Emergency management

Managers must:

- a. Develop and implement plans and precautions with the procedures to be followed in emergencies such as fire, leaks, disease outbreaks, climate extreme conditions,

- problems with transportation, and any other catastrophic events that may adversely affect water quality, such as algal or jellyfish blooms.
- b. Provide an emergency action note, sited in an easily accessible location, highlighting the appropriate emergency contact phone numbers and a map grid reference for the location of the unit.
 - c. Ensure that all relevant staff members are fully conversant with the procedures which have to be implemented if there is a fish escape incident, including the plans for the recapture of escaped fish.

B. Inspection and Records

M 4: Operations records

Operations records must be kept up-to-date and made available to the inspector. These records include, at a minimum:

- a. details of origin of stock, allowing traceability
- b. control of other animals
- c. crowding and grading records
- d. calibration records
- e. numbers, age and weights/uniformity of fish in each tank/enclosure
- f. estimated current stocking densities in each tank/enclosure
- g. where appropriate, target age and weight at which fish will be transferred to sea or slaughtered (in order to predict final stocking densities)
- h. details of fish and equipment inspections
- i. daily and cumulative mortality expressed as a percentage (reasons stated)
- j. daily and cumulative culling expressed as a percentage (reasons stated)
- k. feed consumption
- l. details of any health problems
- m. details of any medication/vaccinations applied
- n. records of smoltification monitoring
- o. records of regulatory correspondence (SERNAPESCA, SUBPESCA, SAG, etc)
- p. records of water quality tests as appropriate to the system
- q. records of net inspections and maintenance
- r. training records
- s. full details of fish movements.

M 5: Monitoring fish

- a. Fish must be inspected at regular intervals, at least twice daily, weather permitting.
- b. Any welfare problems seen during an inspection by the stock-keeper must be dealt with appropriately and without delay.
- c. If problems are identified during an inspection, the stock-keeper must act promptly to discover the cause and take remedial action, in consultation with a veterinary when necessary.
- d. Full records must be maintained of inspections, including:
 1. the time and date of inspection;
 2. the signature(s) of the person(s) conducting the inspection for each group of animals;

3. details of any problems identified and any actions taken including those relating to moribund/injured/damaged fish, where the reason for the problem must be recorded.

M 6: Dead/moribund fish

- a. Removal of dead/moribund fish from the surface or the mortality removal system must occur as frequently as is necessary and, in any case:
 1. at least twice a week, unless adverse weather conditions put at risk personnel;
 2. at least daily for land-based systems.
- b. The known causes of death must be classified and veterinary advice should be sought if the cause of death is not clear according to the criteria identified in the VHWP (HH 1).
- c. Relevant staff must demonstrate competence in interpretation of mortality records.

M 7: Equipment

- a. Any equipment defects must be immediately rectified or, if this is not possible, alternative measures must be taken to safeguard fish welfare.
- b. Alternative measures must be written into the Emergency Action Plan section of the VHWP (see HH 1) and all staff must be made aware of them.

M 8: Complaints to Operators

- a. To be certified, an Operation must maintain systems for receiving, responding to, and documenting complaints alleging the Operation's failure to comply with *Humane Farm Animal Care* standards.
- b. Whenever an Operator receives a complaint, the Operator must record:
 1. Date
 2. Complaint format (written or verbal)
 3. Complainant
 4. Description of complaint
 5. Action taken to resolve the complaint
 6. Results of action taken
 7. Supervisor initials
- c. Operators must notify *Humane Farm Animal Care* if an adverse ruling (such as suspension or revocation of certification, fine, or sanction) related to the Operation's humane management practices is levied against the Operation by another certifier or by a governmental program which regulates the industry.

PART 6: HEALTH AND HUSBANDRY PRACTICES

OBJECTIVES: Fish must be protected from pain, injury and disease. The environment in which they are raised must be conducive to supporting good health. All producers must develop a health plan in consultation with their veterinarian. Animals need to be handled in a considerate and skilled manner.

A. Health Care Practices

HH 1: Veterinary Health and Welfare Plan (VHWP)

- a. A site-specific Veterinary Health and Welfare Plan (VHWP) must be drawn up for both fresh or sea water facilities, reviewed and regularly updated in consultation with a veterinarian:
 1. at the start of every production cycle or on an annual basis;
 2. by those with responsibility for the health and welfare of the fish, which may include the vet, health manager, stockpersons, nutritionist and other relevant personnel;
 3. and details of the review must be made available on request.
- b. The VHWP must include future husbandry plans, risk assessment, monitoring and control of fish health and diseases.
- c. The VHWP must be treated as a live document and therefore if a problem is identified, the VHWP must be revised without delay to ensure that the welfare of the fish is not compromised.

HH 2: Notifiable diseases

All relevant legislation regarding notifiable diseases must be understood and adhered to.

HH 3: Preventing injuries

- a. There must be no recurring physical damage occurring on fish attributable to features of their environment, husbandry procedures or unrecognized disease challenge.

Recurring physical damage is that seen on a number of fish, with sufficient similarity to suggest a common cause, for example poor tank or enclosure design, methods of handling or a husbandry procedure. Different types of physical damage may also suggest a common cause.

- b. Fish condition must be continuously monitored for signs of disease or problems with the environment or handling practices.

HH 4: Care of sick and injured animals

Any fish suffering from overt physical damage, or disease symptoms, must be:

- a. Segregated;
- b. Treated / humanely euthanized without delay.

HH 5: Casualty slaughter

- a. Any seriously sick or injured fish, or fish found not to be recovering, must be humanely killed without delay. Records of this must be made available on request.
- b. During the seawater stage, in addition to anesthetic overdose, the following are permitted for the emergency killing of fish:
 1. a priest of appropriate size for the fish;
 2. a mechanical percussive device.
- c. Use of the emergency killing methods listed under HH 5.b must result in a non-recoverable percussive blow to the head of the fish to render it immediately insensible.
- d. Under no circumstances must seriously injured or sick fish be left to die in air.
- e. Culling of sick or injured fish must only be conducted by suitably trained and competent people.

HH 6: Biosecurity

High standards of biosecurity must be maintained to avoid the spread of diseases between different populations of fish, as specified in a written policy, contained within the VHWP (see HH 1).

B. Handling

HH 7: Handling

- a. Removal of fish from water and handling must only be carried out when absolutely necessary.
- b. If fish must be handled:
 1. adequate support must be given to the fish's body;
 2. live fish must never be held by the tail only or thrown over solid objects.
- c. Time out of water must:
 1. be kept to the minimum possible;
 2. never exceed 15 seconds for a live fish (unless anaesthetized).
- d. Fish must not be left to die in air.

HH 8: Pumps / Pipes / Hand nets

- a. Where pumps and pipes are used these must:
 1. not unnecessarily stress fish;
 2. be appropriate for the size of the fish being pumped to avoid injury;
 3. be free from sharp protrusions, joints, kinks, bends or rough inner edges that are likely to injure fish.
- b. Wherever pipes are used, there must be a humane method in place to ensure that all fish have been removed from the pipe at the end of the operation or if equipment fails during the process.
- c. The drop from the end of any pipe must be such that it:
 1. avoids injuring the fish;
 2. allows fish to disperse without others landing on top of them.
- d. When hand nets are used they must be:
 1. of a suitable size;

2. designed to avoid the occurrence of physical damage;
3. kept clean, in good repair and disinfected before use with different fish populations.

C. Treatment and Vaccination

HH 9: Injection procedures

- a. Any injection delivery to fish at freshwater or sea site must be described in the VHWP.
- b. All injection procedure must be continuously monitored to ensure the welfare of fish is not compromised.
- c. Mortality checks must be recorded within 48 hours after injection delivery.
- d. Drugs administered via injection must be used according to manufacturers' instructions.
- e. Fish must not be crowded for more than two hours, and no enclosure must be crowded more than twice in any one week or three times in any month, unless required otherwise by the attending veterinarian.
- f. After transfer to sea, smolts must not be handled for at least 120 days, for example not crowded, except for veterinary treatments or sampling required by the competent authorities.
- g. Operators must regularly inspect needles and replace them if necessary, according to manufacturers' instructions.
- h. Audit sampled fish must only be culled by trained/competent personnel.
- i. The appointed supervisor/injection team leader must check at the beginning of the process, and at regular intervals during the day to ensure that the procedure is being done correctly. Records of these checks must be made.
- j. The injection procedure must be subject to a third-party audit.

HH 10: Anesthesia procedure

- a. All fish must be properly anesthetized before being injected and the procedure must be carried out by trained, competent personnel.
- b. Anesthetics must be used according to manufacturers' instructions and must:
 1. be on site before vaccination commences;
 2. only be administered to fish by suitably trained staff.
- c. Following injection, any gradients from the injection table to the recovery tank/pen must be such that the fish are not at risk of hitting the bottom of the tank/pen or other fish.
- d. Care must be taken when returning the recovering fish to the tank/pen following the anesthetic/injection process.
- e. There must be a team member with responsibility for:
 1. monitoring regularly the oxygen levels at a minimum of 7mg/L in the anesthetic bath and at the recovery tank to ensure that they are recovering from the anesthetic process;
 2. check the depth and flow of water to ensure that returning fish are not returned to water that is either too shallow, or at an incorrect flow rate, depth or quality.
 3. rectify and record any issues.

HH 11: Treatments

- a. The medication for treatment must only be administered to fish:
 1. by suitably trained staff;
 2. strictly in accordance with the instructions prescribed, which must be on site before the treatment commences.
 3. when advised by the attending veterinarian and in accordance with current legislation for use in Atlantic salmon.
- b. In exceptional circumstances, on the advice of the designated veterinary, specific products licensed for use in other farmed species can be administered as detailed in the VHWP, providing that a valid discharge consent is held from the appropriate government body.
- c. Veterinary medicine withdrawal periods must be strictly met.
- d. Veterinary products must be properly labelled and stored.
- e. Records must be kept of all treatments.
- f. Any treatments that have clearly not worked or had an adverse reaction must be:
 1. recorded in the medicine record book;
 2. reported to the farm veterinary and health manager.

HH 12: Freshwater vaccination

- a. The VHWP must have a detailed vaccination program.
- b. Vaccination at 1-gram liveweight must be by the immersion method only.
- c. Prior to vaccination, there must be a vaccination plan in place, which must:
 1. be agreed and signed by the vaccination team leader and site appointed supervisor;
 2. include the number and weight of the fish to be vaccinated;
 3. detail the expected timeframe of the process.
- d. Vaccination teams must ensure that all staff working with stock are trained and competent in the aspects of the vaccination process to which they are assigned;
- e. Site staff must ensure that all fish have been pre-graded before they are vaccinated.
- f. Vaccines must be used according to manufacturers' instructions.
- g. Vaccines and anesthetics must:
 1. be on site before vaccination commences;
 2. only be administered to fish by suitably trained staff.
- h. Water temperature for vaccination must be according to manufacturers' instructions.
- i. All fish must be suitably anesthetized before being vaccinated.
- j. Where fish are humanely dispatched at the freshwater stage this must be undertaken through an overdose of a suitable anesthetic.
- k. At the end of the process there must be a reconciliation between the amount of vaccine used and the number of fish which have been vaccinated. This must be recorded.

HH 13: Freshwater automated vaccination

- a. All fish must have been pre-graded before they are vaccinated.
- b. An assessment of fish condition must be made before the grading process begins, to ensure that they are robust enough to endure the grading procedure, where machines simultaneously grade fish at vaccination.
- c. The equipment must:

1. be thoroughly checked after transportation for any damage/broken parts which may halt the vaccination process;
 2. be calibrated according to the size of the fish, taking into account the vaccination depth, position, angle and dosage of the vaccine;
 3. be checked for the correct calibration at least once per hour during the vaccination process.
- d. A sample number of fish must be vaccinated to check the calibration before the main process is started.
 - e. The sample fish must be humanely culled before any inspections to check for vaccination accuracy.
 - f. All fish must be anesthetized before being vaccinated.
 - g. There must be continual monitoring to check for any fish which may have become trapped in the pipes of the machine. These checks must be recorded.
 - i. Needles must be inspected at least every two hours and replaced according to manufacturer's guidelines.
 - j. After transportation, the machine must be thoroughly checked to ensure that any working parts have not been damaged during the transportation process.
 - k. At the end of the process there must be a reconciliation between the amount of vaccination used and the number of fish which have been vaccinated. This must be recorded.

D. Mortality, Mutilations, Genetic Selection

HH 14: Mortality recording and reporting.

- a. Where the level of fish mortality exceeds the threshold indicators shown below, this must be recorded and reported to HFAC within 72 hours:
 1. Freshwater:
 - Egg to 1st feed: 6% weekly
 - 1st feed to 5g: 3% weekly
 - 5g to smolting: 1.5% weekly
 2. Seawater:

Site average weight (g)	Max. weekly mortality (%)	Max. 5-week cumulative mortality (%)
Under 750	1.5	6
750+	1.0	4

- b. Where the level of mortality exceeds the above:
 1. an investigation must take place relating to the cause of the mortality;
 2. a plan must be put in place to address the issue.

HH 15: Mutilations

- a. Any mutilation involving the removal of sensitive tissue is prohibited.
- b. Marking methods that cause distress or injury to fish must not be used.

HH 16: Generic selection and modification

- a. Genetic selection techniques are prohibited.

- b. Fish must not have been produced by breeding techniques that result in health or welfare problems for any of the animals involved.
- c. Breeding procedures that adversely affect the welfare if the fish are prohibited.

E. Grading/Crowding at Freshwater Enclosures and Seawater Sites

Optimizing husbandry practices and farming environments can significantly reduce the creation of size hierarchies within populations, and therefore also reduce the requirement to grade. For example, evidence shows that feed distribution and ration size are extremely important, as is knowing how many fish and of what size are present in the population. Underfeeding quickly results in the development of a hierarchy which, if allowed to prevail, can be the cause of welfare problems for some fish.

Lighting strategies can also reduce or eliminate the need to grade maturing populations.

HH 17: Grading plan

- a. Grading must only be performed when absolutely necessary.
- b. A written grading plan must be agreed between farm management and site staff and/or grading operator prior to operations commencing. This plan must become a part of the VHWP (see HH 1).
- c. The grading plan must include:
 - 1. the reason for the need to grade;
 - 2. a pre-grade risk assessment;
 - 3. the number of fish to be graded per day;
 - 4. the location of fish populations both pre- and post- grade;
 - 5. the pre-grade fasting period;
 - 6. the health status of the fish;
 - 7. the equipment to be used, including the type of grader;
 - 8. expected timetable for completion of the grade;
 - 9. the required number of staff and duties to be performed;
 - 10. the physical characteristics of the site such as water temperature, tides and weather conditions;
 - 11. the training records of the grading team;
 - 12. the requirement for a post grading health check;
 - 13. post grading mortality records;
 - 14. any relevant contingency plans;
 - 15. the agreement and signatures of the site manager and the person in charge of the grading equipment.

HH 18: Grading equipment

- a. All grading equipment must be designed and maintained to prevent damaging or causing stress to the fish.
- b. Sweep nets must be of knotless material, of optimal design for the enclosure, and of an appropriate mesh size for the fish.

- c. Sweep nets must be used to crowd a portion of the population rather than crowding the whole enclosure.
- d. Enclosure nets must be kept clean to avoid water quality problems during crowding.
- e. All equipment must be thoroughly cleaned and disinfected before use and between sites.

HH 19: Grading process

- a. Only healthy fish must be subjected to the grading process.
- b. Grading all populations into new enclosures is preferable to optimizes fish welfare.
- c. Prior to grading, fish must be fasted for the minimum period required in order not to compromise their welfare (see F8).
- d. If fish are being returned to their original enclosure, it must be large enough to ensure the welfare of both the original and returning populations.
- e. The grade must be completed in one continuous operation.
- f. Fish must not be crowded for more than two hours.
- g. No enclosure must be crowded more than twice in any one week or three times in any month, unless this is required by the designated veterinary for fish welfare reasons.
- h. Grading operations must not take place if adverse weather conditions are likely to compromise fish welfare.

HH 20: Monitoring

- a. Producers must:
 - 1. humanely cull any extraneous/non-target fish that are present in the tanks or enclosures;
 - 2. be aware of, and adhere to, any legislation relating to protected species.
- b. Fish must be monitored throughout the operation by a designated person properly trained and competent whose responsibility it is to recognize welfare issues and take appropriate action if necessary.
- c. Mortality checks must be recorded as soon as possible after grading.

HH 21: Oxygen levels

- a. Oxygen levels in the water must:
 - 1. be monitored and recorded throughout all crowding operations (e.g. grading, vaccinating and treating);
 - 2. not fall below 7mg/l, with appropriate action taken should this occur.
- b. Supplementary oxygen and/or aeration must be available for the duration of the crowding procedure.

HH 22: Passive grading

- a. Where passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within. Passive grading must be carried out where possible and practical.
- b. The grading panels must be pre-checked for signs of wear before grading commences.

HH 23: Manual grading

- a. Pumps must be able to pump the required distance and head.
- b. The operator must be able to control the speed of the pump.

- c. All pipes must be:
 - 1. smooth with swept bends;
 - 2. of a diameter which is appropriate for the size of the fish, including when they pass through the couplings.
- d. Water must always flow through the pipework to minimize the incidence of scaling.
- e. The grading table must be smooth, with no sharp edges.
- f. Where counters are used, they must be in working order and be fit for purpose.
- g. The sweep net/crowding device must:
 - 1. be of an appropriate size;
 - 2. have sufficient floatation;
 - 3. be constructed of knotless mesh.
- h. No fish must be kept out of the water for more than 15 seconds unless anesthetized.

HH 24: Wellboat grading

- a. All wellboat crew involved in the grading process must have received the appropriate welfare training in addition to their maritime responsibilities.
- b. There must be a nominated person who is responsible for the care of the fish during the time that they are on board.
- c. All equipment must be checked to ensure that it is working and fit for purpose before pumping commences.
- d. Extreme care must be taken when pumping the fish.
- e. The grader must be positioned so that the crew member operating the pumps can clearly see the fish.
- f. Graders must have safe personnel access around them to facilitate routine inspection.
- g. Returning pipes must:
 - 1. be fully supported;
 - 2. have minimal joins;
 - 3. be of sufficient length to safely return graded populations away from the edge of the enclosure.
- h. Before leaving the site, careful inspection and disinfection of the equipment must be carried out as appropriate.

Vacuum pumping fish twice within 24 hours is not optimal welfare practice. Consideration and preference should be given to the use of wellboats with 'over-pressure' (reverse siphon) discharge capability where possible.

- i. Any fish that are placed in the hold after grading must be subjected to an additional welfare risk assessment. Any additional fasting period must be authorized by the veterinary or health manager and must be recorded in the VHWP (see HH 1).
- j. Discharges which do not entail the use of moving bulkheads must have the ability to trim the wellboat during the final stages of the discharge to prevent compromising the welfare of the last fish.
- k. The maximum stocking density in the well must be based on the liveweight of the fish as follows:

Liveweight of fish (kg)	Maximum stocking density (kg/m³)
5.0	125

4.0	110
3.5	100
3.0	90
2.0	75
1.0	60
0.1	45

- l. The water quality, husbandry, biosecurity and records kept must conform to those as per the wellboat harvesting standards.
- m. There must be a site grading plan for inspection.

HH 25: Pushing / towing enclosures

- a. The speed of pushing must be suitable for the size of the fish.
- b. There must be a designated person on the enclosure who is responsible for maintaining the welfare of the fish.
- c. There must be clear communication between the skipper and the designated person on the enclosure.
- d. The speed of the pushing must not be faster than the speed of the swimming fish.

F. Sea Lice

The problems involved with availability of effective treatments for sea lice infestations are recognized. The welfare and environmental impact of treatments must be given full consideration. HFAC will monitor the situation and review new technology and research as it develops.

HH 26: Sea lice

- a. Farms must take all reasonable steps to minimize the gravid lice population, as per the requirements of local regulation.
- b. Stock-keepers must be able to recognize symptoms of lice infestation.
- c. Separation of year classes and fallowing of sites must be practiced to help control sea lice populations as detailed in the Environmental Impact Plan.
- d. The producer must, through documented evidence, demonstrate that any co-operative management schemes between operations in the same sea water area aimed at reducing sea lice populations have been entered into.
- e. Sea lice prevention and treatment programs must be drawn-up with the designated veterinary and fully detailed in the VHWP.
- f. Sea lice damage to fish must be recorded during lice counts. This must include:
 - 1. condition of fish – good/thin;
 - 2. site of lesions;
 - 3. skin condition;
 - 4. fish behavior – lively/moribund.
- g. Any fish with severe physical damage caused by sea lice grazing must be removed and culled humanely without delay.
- h. Non-medicinal sea lice removal technologies must be risk assessed against the impact they may have on the welfare of the fish, prior to each use of the technology.

- i. The requirement to complete the lice removal risk assessment must be included in the VHWP and made available upon request.
- j. There must be a designated person responsible for the welfare of the fish during the lice removing process.

G. Protection from Other Animals

HH 27: Precautions and protection from other animals

- a. Humane precautions must be taken to protect salmon from other animals that could cause them harm, including bringing in diseases.
- b. Methods used to protect the fish must be written in the Predator Control Plan.
- c. The primary means of protecting the fish must be through physical exclusion, by denying other animals access to tanks and enclosures.
- d. If the fish have been attacked, they must be checked for signs of any injury without delay from the time the attack became apparent.

HH 28: Wild animals in enclosure nets

- a. The following details of all wild animals removed from nets must be recorded:
 - 1. species;
 - 2. date of removal;
 - 3. whether the animal was dead or alive on removal.
- b. Enclosures must be:
 - 1. protected using visible top nets that are secured to prevent the ingress of predators into the enclosure;
 - 2. of a mesh size that does not ensnare birds.

HH 29: Predator-proof nets

- a. Predator-proof nets must be considered for deployment at high-risk sites during the high-risk periods, and at all other times if there is a risk of attack.
- b. Where predator-proof nets cannot be deployed for animal welfare reasons, the precise nature of the animal welfare reasons must be documented and recorded.
- c. Shooting of sea lions is not permitted.

HH 30: Acoustic Devices

- a. Acoustic Deterrent Devices/Acoustic Startle Devices (ADDs/ASDs) may only be used in accordance with any required licensing requirements, legislation, codes and/or guidelines.
- b. If ADDs/ASDs are used, they must be:
 - 1. models which operate in a way that do not negatively impact non-target species;
 - 2. effective in deterring seal depredation;
 - 3. regularly serviced and maintained to ensure that they are in full working order.
- c. If ADDs/ASDs are deployed:
 - 1. the ongoing operating status of ADD/ASDs must be recorded as part of the daily site checks;
 - 2. the date of deployment of the devices must be recorded in the VHWP.

PART 7: TRANSPORTATION

Objectives: Transport systems need to be designed and operated to ensure that fish are not caused unnecessary distress or discomfort. The transport and handling of fish needs to be kept to an absolute minimum. Persons involved in transport need to be thoroughly trained and competent to carry out the required tasks.

A. General Transport

T 1: Transport suppliers allowed

All suppliers of different modes of transport (road/helicopter/wellboat) used for fish from Certified Humane approved sites must be previously approved by HFAC.

T 2: Training and awareness of welfare

- a. All persons involved in transportation of fish must be familiar with, and transport fish in accordance with all relevant legislation.
- b. Transport operators must ensure that all persons involved in the transportation of the fish have a copy of the current version of the ‘HFAC Welfare Standards for Farmed Atlantic Salmon’ at each site or vehicle and:
 1. are familiar with its content;
 2. understand and apply its content;
- c. All staff working with, or handling fish must be:
 1. trained and competent;
 2. aware of their duties;
 3. aware of any welfare risks involved;
- d. Records of staff training must be kept and made available during the HFAC inspection and upon request.

T 3: Planning and communication

There must be good lines of communication between all of those involved in transporting/harvesting/grading fish in order to avoid potential or actual welfare problems occurring with the fish. These communications must include the:

- a. Number of fish to be transported;
- b. Size range of the fish;
- c. Weight of the fish;
- d. Current health status of the fish.

T 4: Handling

Any handling of fish prior and during to transport must:

- a. Be kept at minimum;
- b. Be conducted in such a way as to prevent any unnecessary distress to the fish;
- c. Not result in fish being out of water for more than 15 seconds (unless anesthetized).

T 5: Water quality

- a. Changes in water temperature and pH during must be avoided, kept as close as possible to that from which the fish came.
- b. Water must be free from contaminants which may be detrimental to the welfare of the fish.

B. Site Staff Responsible for Moving Fish

T 6: Transport plan

All journeys fish is subjected to must have a transport plan, which:

- a. Is up to date;
- b. Covers important aspects of the journey, including:
 1. journey times;
 2. water qualities;
 3. contingency plans;
 4. identity of those responsible for fish welfare.
- c. Site managers must ensure that all staff, including transport staff, are aware of this transport plan.

T 7: Fish fit for transport

- a. Only healthy, undamaged fish must be transported.
- b. Care must be taken to ensure dead fish are not loaded for transport.
- c. Sick or seriously injured fish must:
 1. not be transported;
 2. be humanely destroyed.

T 8: Monitoring and records

- a. There must be a named member of staff responsible for monitoring the welfare of the fish during loading, transport and unloading.
- b. Records of procedures relating to loading, transport and unloading must be maintained and include details of any casualties or compromises to the welfare of the fish.
- c. The following records must be kept:
 1. time since last handling;
 2. time since vaccination;
 3. time since last treatment (including anesthetic);
 4. feed withdrawal period;
 5. date of full smoltification;
 6. any clinical signs of disease;
 7. crowding records;
 8. oxygen levels during crowding;
 9. numbers of fish in each tank to be transported;
 10. stocking densities of tanks being used for transport.

T 9: Fasting

Pre-transport fasting must:

- a. Never exceed 48 hours for freshwater fish and 72 hours for sea fish, unless specified otherwise by a veterinarian;
- b. Be recorded in the VHWP where it exceeds the time limits mentioned above with related causes.

T 10: Bath treatments

Any bath treatment must be:

- a. completed at a minimum of 14 days before transport, unless stated otherwise by veterinary advice,
- b. and recorded in the VHWP.

T 11: Nets for transport

- a. Hand nets must:
 - 1. be of a correct size so that they can be easily lifted and the fish at the bottom of the net are not injured;
 - 2. have a suitable mesh size for the size of the fish which prevents fish escaping;
 - 3. not be overfilled.
- b. Fish must not be netted before they are ready to be received at the transport tanks/helicopter buckets.
- c. The netting of the last fish in any tank must be undertaken with a great deal of caution and care so as not to injure any fish.

C. Transport Staff

T 12: Equipment inspection

- a. All equipment that the fish rely on for life support must be inspected at least every 4,5 hours.
- b. If any faults are found in the equipment:
 - 1. any fish in transit must be inspected;
 - 2. any problems must be corrected immediately.

T 13: Management of oxygen, water temperature and pH

- a. Supplementary oxygen or aeration must be available during all transportation, which is sufficient to last at least 50% longer than the anticipated journey length.
- b. Oxygen levels must be:
 - 1. monitored throughout the journey (including for any internal journeys);
 - 2. maintained at a minimum of 80% saturation and/or a minimum of 7mg/liter.

T 14 Records of dead or injured fish

- a. Any fish which died during transportation must be separated from live fish immediately upon arrival.
- b. Records must be kept of any deaths or injuries that occur during transportation.

T 15 Cleaning and disinfection

Transport containers must be cleaned and disinfected after each consignment, to prevent the spread of disease.

D. Fry Transport

T 16: Fry transport

- a. Calculation of stocking densities of the floor area of tanks must consider the tendency of fry to crowd together on the bottom of the tank.
- b. The oxygen supply to the bottom of the tank must concern the nature of fry crowding behavior.
- c. If a hose is used to flush the tank out at the end of a discharge, it must not be aimed at the fish, but at the side of the tank to avoid injuring the fish.
- d. Oxygen levels must be:
 1. continuously monitored;
 2. maintained at a minimum of 7mg/liter.
- e. Air sausages must be securely attached to avoid damaging the fish.
- f. Ferries must be pre-booked prior to sailing.

E. Road Transport

T 17: Driver's responsibilities

- a. The driver of the vehicle must:
 1. be fully aware of the transport regulations relating to the fish;
 2. understand the needs of the fish being transported;
 3. drive in a manner which will not compromise the welfare of the fish.
 4. Be properly trained for this duty.
- b. Before leaving the site, the driver must:
 1. perform a visual check of the oxygen levels and rates of aeration into the tanks;
 2. record the oxygen levels on the record sheet.
- c. During the journey, if oxygen levels become unstable, the driver must:
 1. be able to visually check the fish for signs of stress;
 2. be able to identify the cause of the oxygen instability;
 3. take appropriate action to ensure the welfare of the fish.
- d. Drivers must be able to gain access below deck during the journey to monitor the welfare of the fish.
- e. When arriving at the discharge site, the driver must:
 1. have been aware of the biosecurity/environmental requirements before arrival on site;
 2. ensure compliance with any biosecurity/environmental requirements.

T 18: Transport tanks and openings

- a. Tank insulation must be such that it allows the water to remain at a constant temperature at approximately ± 1.5 °C from the start of the journey.

- b. All transport tanks and life support systems must:
 - 1. be fit for purpose;
 - 2. fully inspected before loading;
 - 3. be without leaks, chips or cracks.
- c. All lids, outlets and any other openings must be fully secured before departure.

T 19: Stocking density and water quality

- a. Tanks must be filled to the top with good quality water (see PS 4) from a known source once stocking density has been reached (see PS 3).
- b. The maximum stocking density must be set so that water quality is maintained for the duration of the journey.
- c. Diffused oxygen must be spread around the water column using an oil free compressor.
- d. There must be sufficient aeration to avoid deadspots inside the tanks.

T 20: Ferries

- a. If a journey requires the use of a ro-ro ferry, procedures must be in place to ensure the welfare of the fish during the journey.
- b. Any ferries used must be pre-booked before sailing.

T 21: Unloading

- a. After arriving on site, discharge must take place without undue delay.
- b. The lorry must be sited to ensure that all tanks can be fully emptied, considering any cambers which may be apparent in the ground.
- c. Valves must be suitable for more than one fish to pass through at any one time.
- d. All pipes must be securely attached to prevent fish from escaping during the unloading process.
- e. All unloading must be through valves rather than netting fish from the tanks.
- f. Any pipes must be able to be adjusted to account for any rise and fall in the tide.
- g. Water must always be in the tanks during unloading to avoid the last fish becoming dry and without oxygen.
- h. There must be a system for flushing the tanks at the end of unloading to ensure that the last fish is removed without compromising their welfare.
- i. Tank design must facilitate the discharge of the last fish by having sloping floors which guide them to the outlet.

F. Helicopter Transfer

T 22: Staff involved

- a. Pilots and ground crew must be trained and competent in the welfare consequences of how they handle fish.
- b. There must be staff available at each site receiving fish who are aware of the necessary procedures to safeguard welfare.
- c. Site staff must be able to communicate with the loading site and the helicopter crew.

T 23: Preparations

- a. All receiving enclosures must be clearly identified, e.g. with marker buoys.
- b. Helicopter buckets and other ancillary equipment must be:
 1. fully maintained;
 2. clean;
 3. fit for purpose.
- c. There must be sufficient buckets to ensure that the time that fish must wait for transportation does not compromise their welfare.
- d. The planned maximum journey time to the discharge site with fish on board must be no longer than 15 minutes.
- e. A sample weight of fish must be known before loading commences.
- f. There must be a contingency plan in place for:
 1. bad weather;
 2. if a bucket will not open.

T 24: Loading

- a. The fish must be transferred from the tanks/rearing enclosures without causing injury to fish.
- b. The loading of the fish into the buckets must coincide with the arrival of the helicopter.
- c. The helicopter bucket must contain approximately two thirds water before any fish are loaded into it.
- d. The life support system of the bucket must be switched on and working before the fish are put in.
- e. Helicopter buckets must have their own independent supply of oxygen.
- f. The oxygen levels in the bucket must be:
 1. the same as that of the tanks from where the fish came;
 2. maintained at a minimum of 7mg/liter.
- g. The maximum stocking density in the bucket must be no greater than 400kg/m³.

T 25: Unloading

- a. The helicopter bucket must be lowered gently into the water when unloading the fish to avoid injuring them.
- b. The helicopter bucket must be allowed to empty completely before moving off.

G. Wellboat Transport (Smolts) and Seawater Site Staff (Receiving)

T 26: Requirements for wellboats and planning

- a. Wellboats arriving in Chile to work within Chilean waters must carry a valid certificate of disinfection from their site of origin.
- b. Only wellboats with the ability to run on closed valves are permitted.
- c. The journey must be planned to ensure that arrivals at the loading and unloading sites are such that they avoid delays in moving the fish.
- d. There must be enough light in the well to enable easy inspection of the fish.

T 27: Competent staff

All staff responsible for receiving fish and all vessel crew members must be trained and competent to preserve the welfare of the animals, recognize and solve eventual problems promptly.

T 28: Stocking density and fish counting equipment

- a. Maximum stocking densities must:
 1. be within 40–50kg/m³ (depending on water quality and size of smolts);
 2. be set so that water quality can be maintained over the length of the journey.
- b. If fish counting equipment is in place, it must:
 1. be over a de-waterer;
 2. be fully maintained;
 3. be regularly calibrated to maintain accuracy;
 4. be of a design not likely to cause damage or injury to the fish.
- c. The number of fish to be loaded must be known to be able to verify compliance with the stocking density.
- d. A system must be in place to ensure that the numbers of fish to be discharged into each receiving enclosure is pre-planned and reported to well boat staff before discharge begins.

T 29: Pumps, pipes and discharge

- a. The unloading of fish must not take place if adverse weather conditions are likely to compromise the welfare of the fish.
- b. Adjustments must be made to the trim/balance of the wellboat to ensure fish are aligned with the discharge point.
- c. Pumps and pipes used for unloading must be positioned to minimize the height and distance that the fish have to be pumped.
- d. The pipe layout angle and drop must:
 1. lead to good distribution into the enclosure;
 2. minimize the risk of collisions between fish.
- e. Pumps and pipes must be free of any rough edges which might damage the fish.
- f. There must be a method in place to ensure that no fish are left in the pipes after pumping, or during a breakdown.
- g. Water flow through the wells at discharge must:
 1. be sufficient to facilitate movement of the fish;
 2. not be so strong as to cause the fish injury.
- h. A humane process must be in place to safeguard fish welfare when removing the last fish from the well.
- i. The nets at the reception enclosure must:
 1. be set at a sufficient depth to permit inspection;
 2. not be so shallow that fish are stressed by strong sunlight.

T 30: Records of mortality

- a. The fish must be given humane protection from birds and marine predators.
- b. Producers must be able to demonstrate that they have done everything possible to ensure maximum survival when smolts are transferred to sea.

- c. Dead and moribund fish must be disposed of humanely and hygienically.
- d. Records of all dead and moribund fish must:
 - 1. be kept;
 - 2. include the cause of death where possible and any other information relating to the health and welfare of the fish;

H. Harvest Wellboats

T 31: Requirements for wellboats and planning

- a. Wellboats arriving into Chile to work within Chilean waters must carry a valid certificate of disinfection from their site of origin.
- b. Wellboat cleaning procedures must comply with local disinfection guidelines .
- c. There must be written contingency plans to accommodate unforeseen circumstances associated with the journey.
- d. Multi-site collections are prohibited (collections of fish from different sites from different disease control areas are prohibited).
- e. Intra-site collections and collections from neighboring sites of the same year class are allowed, but these must be recorded.

T 32: Competent staff

All vessel crew members must be trained and competent to preserve the welfare of the animals, recognize and solve eventual problems promptly.

T 33: Wellboat equipments and systems

- a. The wellboat must be fitted with moveable bulkheads or other systems used for unloading fish which do not compromise their welfare.
- b. There must be sufficient natural or artificial lighting to enable continuous inspection/monitoring of the fish throughout the well.
- c. All wellboats registered to operate in Chilean waters must be fitted with auto-logging systems which can:
 - 1. record their position;
 - 2. determine whether all inlet, outlet and bottom valves are either open or closed at any one time;
 - 3. enable the information to be available in real time and retrospectively;
 - 4. kept for a period of at least 14 days.
- d. Where systems are reliant on automatic monitoring equipment, this equipment must be alarmed and underpinned by fully operational manual back-up systems (e.g. water quality control methods, such as oxygenators/aerators and carbon dioxide strippers).
- e. Weekly checks must be made and recorded for the calibration accuracy on automatic equipment.
- f. Where calibration is not possible, there must be a demonstrable way of ensuring that the equipment is working properly.
- g. All auto-logging systems must have been certified as being accurate and fit for purpose by a competent independent expert.

- h. Wellboats must be equipped with water quality monitoring and maintenance equipment, which must be calibrated so it is always working and fit for its purpose.
- i. Weekly checks must be made and recorded for the calibration accuracy on automatic equipment ensuring that it is working properly.
- j. Any onboard/onshore water treatment/filtration methods must be recorded, and in the case of Certified Humane members the records made available to HFAC.
- k. All new harvest vessels operating under the Certified Humane program must have an effective lice filtration system in place.

T 34: Stocking density

- a. The wellboat must be able to monitor and record the numbers of fish loaded in each well.
- b. All crowding, loading and unloading of fish must be recorded using CCTV.
- c. Video footage must be kept for at least 14 days.
- d. The maximum stocking density in the well must be based on the liveweight of the fish, as shown below.

Liveweight (kg)	Maximum stocking density (kg/m ³)
5.0	125
4.0	110
3.5	100

T 35: Water parameters

- a. Water must be chilled at a maximum 1,5°C per hour down to a minimum of 50% of ambient water temperature.
- b. The pH of the wellwater must always be between 6.8 and 8.
- c. Oxygen levels must be:
 - 1. continuously monitored;
 - 2. maintained at a minimum of 7mg/liter
- d. Carbon dioxide must be kept below a level that is demonstrably not harmful to the welfare of the fish (as a guide, this must be no higher than 20mg/liter).
- e. The level of ammonia (NH₃) must be no higher than 0.0125 mg/liter (unionized).
- f. Only disinfected water can be discharged upstream of another site.

T 36: Harvesting activities and records

- a. There must be no unnecessary delays in unloading the fish once the vessel has docked.
- b. Pumping of the fish from the well or the holding pen to the slaughter plant must be done in a way that:
 - 1. does not demonstrably compromise fish welfare;
 - 2. ensures that slaughter personnel can maintain an efficient stunning and bleeding procedure.
- c. There must be a procedure in place to ensure the last fish is removed humanely from the pipe at the end of unloading, which must not be injurious to the fish.
- d. Extraneous species must be treated in accordance with the relevant legislation (see E 9 for further information).
- e. The following records must be kept for inspection, and be available on request:
 - 1. wellboat movements;

2. fish movements;
3. times of fish movements;
4. disinfection logs;
5. number of fish loaded;
6. fish size distribution;
7. route covered during transport;
8. timing of open and closed valve operations.

I. Cage Side Harvest

T 37: Wellboats cleaning and disinfection

- a. Wellboats arriving in Chile to work within Chilean waters must carry a valid certificate of disinfection from their site of origin.
- b. Inter-site movement of vessels must be kept to a minimum.
- c. The cleaning and disinfection procedures for wellboats as set out in the current version of local disinfection guidelines according to SERNAPESCA (Servicio Nacional de Pesca y Acuicultura de Chile) must be adhered to, and a checklist signed by the skipper upon completion.

T 38: Equipment

- a. All equipment must be checked regularly and maintained in accordance with manufacturers or in-house maintenance schedules.
- b. All equipment must be maintained in clean, hygienic conditions and must be thoroughly disinfected and rinsed after use.
- c. All storage facilities must
 1. be bunded;
 2. be wind and water tight;
 3. protect against other animals.

T 39: Waste materials

- a. Any visible surface mortalities or obviously moribund fish on the surface must be removed before further operations begin.
- b. All solid and liquid waste materials must be stored and disposed of appropriately and in accordance with relevant legislation.
- c. Cage-side harvest wellboats must not discharge remedial blood water within 5km of any fish farm.
- d. In the case of any remedial blood water that is discharged at sea:
 1. this must be rendered inert and disinfected;
 2. the treatment methods must be recorded and in the case of Certified Humane members the records made available to HFAC.

T 40: Competent staff

All vessel crew members must be trained and competent to preserve the welfare of the animals, recognize and solve eventual problems promptly.

T 41: Record keeping

- a. All crowding and loading of the fish must be recorded using CCTV.
- b. Footage relating to T41 must be kept for at least 14 days.
- c. The following records must be kept for inspection and be available on request:
 1. wellboat movements;
 2. fish movements;
 3. times of fish movements;
 4. disinfection logs;
 5. numbers of fish loaded/fish size distribution;
 6. route covered during transport;
- d. Extraneous species must be dealt with according to the legislation (see E 9 for further information).

PART 8: STUNNING AND SLAUGHTER

OBJECTIVES: The system must ensure sufficient current is passed through the body of the fish for a sufficient duration to render the fish immediately insensible until death supervenes. Fish need to be killed humanely without any unnecessary distress or discomfort. Pre-slaughter crowding and handling needs to be kept to an absolute minimum. Personnel involved in slaughter need to be thoroughly trained and competent to carry out the required tasks.

A. Pre Slaughter

S 1: Holding Pens

When using holding pens before slaughter:

- a. Total fasting period from harvesting to slaughter must not exceed 120 hours or 50-degree days, whichever comes first.
- b. Maximum stocking density must not exceed 15 kg/m³.
- c. Water quality parameters such as temperature and dissolved oxygen (mg/l) must be recorded.
- d. At arrival and prior to pumping to the slaughterhouse, moribund fish must be humanely killed without delay.
- e. Keep records of mortality from arrival until the pen is emptied and all the fish have been transferred to the processing plant.
- f. Weekly mortality above 1% must be recorded and investigated, and a prevention strategy should be considered in the VHWP.
- g. No more than one handling procedure of fish can be carried out in a period shorter than 24 hours.
- h. There must be back-up systems and contingency plans in place to deal with system malfunctions and breakdowns in order to safeguard the welfare of the fish.
- i. There must be continual monitoring to check for any fish which may have become trapped in the pipes. These checks must be recorded.
- j. There must be no unnecessary delays in unloading the fish once the vessel has docked.
- k. The maximum dwell time in the pipe must be no more than 20 minutes. However, when this time exceeds 10 minutes, water quality must be at minimum oxygen level of 7 mg/l, measured at the pipe exit.
- l. Pumping fish from the holding pen to the slaughter plant must be done in a way that:
 1. does not demonstrably compromise fish welfare.
 2. ensures that slaughter personnel can maintain an efficient stunning and bleeding procedure.
- m. There must be a procedure in place to ensure the last fish is removed humanely from the pipe at the end of unloading, which must not be injurious to the fish.

S 2: Competent staff

- a. All relevant personnel must be trained and competent to:
 1. identify signs of an effective stun;
 2. operate the stunning/killing system safely.

- b. There must be a named person responsible for fish welfare throughout the killing process who has been trained in humane killing of fish.

S 3: Water quality in the pipes

- a. Crowding and handling prior to killing must be kept to an absolute minimum.
- b. For both percussion and electrical systems, water at the end of the outflow pipe leading into the slaughter plant must be continuously monitored and recorded for:
 - 1. oxygen;
 - 2. temperature;
 - 3. pH
- c. If the water quality in the pipe falls below a 20% threshold of the well water or seawater enclosure, then immediate remedial action must be taken to make the necessary improvements.

B. Stunning Followed by Bleeding

S 4: Stunner tests

- a. Before the beginning of each harvest, the system must be tested to ensure it is working properly with the first 10 fish in each stunner. Stunner checks must ensure the fish have:
 - 1. no eye movement;
 - 2. no rhythmic opercular movement;
 - 3. only mild short term involuntary muscular twitches;
 - 4. no reaction to tail pinch
- b. The results of the checks must:
 - 1. be recorded;
 - 2. made available on request.

S 5: Stunning equipment

- a. All equipment must be operated in accordance with the manufacturer's recommendations or relevant internal protocols.
- b. Equipment must be fitted with a visible means of checking that the correct current is being administered throughout the process.
- c. All equipment must be:
 - 1. cleaned and maintained regularly and, in any case, at least in accordance with the manufacturer's instructions;
 - 2. fit for purpose at all times.
- d. Contingency plans must be in place to ensure fish welfare is not compromised should there be any equipment or material failure, including an interruption in the electricity supply, loss of water, or breakdown of the water pump.

S 6: Effectiveness of electrical stunning

- a. Whatever electrical process is used (batch, continuous flow etc.) it must be ensured that:
 - 1. insensibility of the fish is achieved immediately;
 - 2. there are no pre-stun shocks;

3. the stun is maintained until the fish dies, or is insensible to percussive stunning.
- b. Fish must be presented to the stunner in a way that prevents:
 1. mis-stunning;
 2. fish missing the stunner, e.g. falling from the stun table to the floor.
- c. There must be a humane process in place to ensure no fish are left in the system at the end of the procedure.

S 7: Effectiveness of the stun

- a. There must be sufficient time after stunning, and safeguards in place, to:
 1. assess the effectiveness of the stun in all fish;
 2. ensure all fish that have not been effectively stunned are re-stunned immediately.
- b. The number of fish that have not been effectively stunned must be recorded.
- c. A Standard Operating Procedure must be in place to detail the procedure for dealing with fish that have not been effectively stunned;
- d. CCTV must be installed to provide clear footage of the back-up stun process.
- e. Footage relating to S 7d must be stored for a minimum of 14 days.
- f. Bleeding must follow within 10 seconds.

C. Slaughter / Killing Including Cage-Side Harvest

S 8: Slaughter / Killing

- a. Farmed fish must be humanely killed.
- b. The method of killing used must rapidly, and without pain and distress, render the fish insensible, until death supervenes.
- c. Humane mechanical devices must be used in preference to a manual percussive blow (except for emergency culling).
- d. The use of mechanical devices must be monitored to ensure that they are working properly and that they are delivering the stun at the correct location.
- e. One blow must be delivered to the top of the head just behind the eyes, of sufficient force to cause immediate loss of consciousness that lasts until death.
- f. A priest or secondary stunner must be available throughout the killing process to allow a percussive blow to be administered immediately in the event of a fish not being effectively stunned.
- g. All blood and mucus from killing operations must be contained and disposed of ashore.
- h. Producers must always:
 1. humanely destroy any extraneous/non-target fish that are present;
 2. be aware of, and adhere to, any legislation relating to protected species.

HFAC is following all new developments associated with the killing of farmed fish. If any of these methods are shown not to compromise the welfare of the fish involved, then consideration will be given to incorporating them into HFAC welfare standards in the future.

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