



# **ASC Freshwater Trout Standard**

**Version 1.2**

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For comments or questions regarding the content of this document, please contact the Standards and Science Team of ASC via [standards@asc-aqua.org](mailto:standards@asc-aqua.org).

### Version control

Document version history:

Version:	Release date:	Effective date:	Remarks/changes:
V1.2	July 11 <sup>th</sup> , 2019	<b>December 26, 2019</b>	Based on the Freshwater Trout Standard review/revision cycle, the following have been updated/modified: <ul style="list-style-type: none"> <li>• 'Principle 7': (Was solely 'Section' in v1.1 Table of Contents): Requirements for Fingerling and Egg Suppliers.</li> <li>• Section 8: New section, titled "Additional requirements for smolts produced in cage-culture operating in freshwater bodies (e.g. lakes, lochs, reservoirs)."</li> <li>• Other updates include layout &amp; UK English-consistent spell-check.</li> </ul>
V1.1	(internal) This version was not published due to ongoing revision of version 1.0	(internal) This version was not published due to ongoing revision of version 1.0	Update of the standard to meet ASC style requirements (e.g. inclusion of structure of the standards, formatting and wording). Align the scope, 'about the ASC' and 'overview of the ASC system'. The content of the actual Standard, as defined by criteria / indicators / requirements under Principles [1-7], remains unchanged.
v1.0	March, 2014	March, 2014	Update of the Standard to further meet lay-out requirements. No content adjustments made.
v1.0	February, 2013	February, 2013	Update of the Standard to meet ASC style requirements (e.g. inclusion of introduction chapters 'about the ASC' and 'overview of the ASC system', formatting and wording). The content of the actual Standard remained unchanged from version 0.1.
V0.1	January, 2013	January, 2013	Original version developed and approved by the Fresh Water Trout Aquaculture Dialogue Steering Committee

			<p>under the original title “Final draft standards for environmentally and socially responsible trout farming.”</p> <p>Handover of the Standard by the Freshwater Trout Aquaculture Dialogue Steering Committee to the Aquaculture Stewardship Council.</p>
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It is the responsibility of the user of the document to use the latest version as published on the ASC website.

## Available language(s)

This document is available in the following language(s):

Version:	Available languages
v1.2 v1.1 v1.1	English (official language)
v1.0	Danish
v1.0	Spanish

In case of any inconsistencies and/or discrepancies between available translation(s) and the English version, the online English version (pdf-format) will prevail.

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## ABOUT THE AQUACULTURE STEWARDSHIP COUNCIL (ASC)

The Aquaculture Stewardship Council (ASC) is an independent, not-for-profit organisation that operates a voluntary, independent third-party certification and labelling programme based on a scientifically robust set of standards.

The ASC standards define criteria designed to help transform the aquaculture<sup>1</sup> sector<sup>2</sup> towards environmental sustainability and social responsibility, as per the ASC Mission.

### ASC Vision

A world where aquaculture plays a major role in supplying food and social benefits for mankind whilst minimising negative impacts on the environment.

### ASC Mission

To transform aquaculture towards environmental sustainability and social responsibility using efficient market mechanisms that create value across the chain.

### ASC Theory of Change

A Theory of Change (ToC) is an articulation, description and mapping out of the building blocks required to achieve the organisation's vision.

ASC has defined a ToC which explains how the ASC certification and labelling programme promotes and rewards responsible fish farming practices through incentivising the choices people make when buying seafood.

ASC's Theory of Change can be found on the [ASC website](#).

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<sup>1</sup> **Aquaculture:** Aquaculture is the farming of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated (FAO).

<sup>2</sup> **Aquaculture sector:** Represents a group of industries (e.g. feed, farming, processing etc.) and their markets that share common attributes (i.e. aquaculture products).



## THE ASC DOCUMENT AND CERTIFICATION SYSTEM

ASC is a full member of the [ISEAL Alliance](#) and implements a voluntary, independent third-party certification system<sup>3</sup> consisting of three independent actors:

- |      |                                  |   |
|------|----------------------------------|---|
| I.   | Scheme Owner                     | i.e. Aquaculture Stewardship Council        |
| II.  | Accreditation Body               | i.e. Assurance Services International (ASI) |
| III. | Conformity Assessment Body (CAB) | i.e. Accredited CAB's                       |

### Scheme Owner

ASC, as scheme owner:

- sets and maintains standards according to the ASC Standard Setting Protocol which is in compliance with the “ISEAL Code of Good Practice - Setting Social and Environmental Standards”. The ASC standards are normative documents;
- sets and maintains Implementation Guidance which provides guidance to the Unit of certification (UoC) on how to interpret and best implement the indicators within the Standard;
- sets and maintains the Auditor Guidance which gives guidance to the auditor how to best assess a UoC against the indicators within the Standard;
- sets and maintains the Certification and Accreditation Requirements (CAR) which adheres at a minimum to the “ISEAL Code of Good Practice - Assuring compliance with Social and Environmental Standards”. The CAR describes the accreditation requirements, assessment requirements and certification requirements. The CAR is a normative document.

These above listed documents are publicly available on the ASC website.

### Accreditation Body

Accreditation is the assurance process of assessing the Conformity Assessment Body (CAB) against accreditation requirements and is carried out by an Accreditation Body (AB). The appointed AB of ASC is Assurance Services International (ASI), (“Accreditation Services International” prior to January 2019) which uses the CAR as normative document for the accreditation process.

Assessment findings of ASI-accreditation audits and an overview of current accredited CABs is publicly available via the ASI-website (<http://www.accreditation-services.com>).

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<sup>3</sup> **Third-party Certification System:** Conformity assessment activity that is performed by a person or body that is independent of the person or organisation that provides the object, and of the user interests in that object (ISO 17000).

## **Conformity Assessment Body**

The UoC contracts the CAB which employs auditor(s) that conduct a conformity assessment (hereafter 'audit') of the UoC against the relevant standard. The management requirements for CABs as well as auditor competency requirements are described in the CAR and assured through ASI accreditation.

## **ASC Audit and Certification Process**

The UoC is audited at Indicator-level.

An ASC audit follows strict process requirements. These requirements are detailed in the CAR. Only ASI-accredited CABs are allowed to audit and certify a UoC against ASC standards. As scheme owner, ASC itself is not - and cannot be - involved in the actual audit and/or certification decision of a UoC. Granted certificates are the property of the CAB. ASC does not manage certificate validity.

Audit findings of all ASC audits, including granted certificates, are made publicly available on the ASC website. These include the audit findings that result in a negative certification decision.

Note: in addition to the Standards, there are certification requirements that apply to UoCs seeking certification; these requirements are detailed in the CAR.

## **ASC Logo use**

ASC-certified entities shall only sell their product carrying the ASC Logo if a Logo Licence Agreement (LLA) has been signed. On behalf of the ASC, the Marine Stewardship Council (MSC) Licensing Team will issue logo license agreements and approve logo use on products. For more information see: [ASC Logo](#).

Unauthorised logo display is prohibited and will be treated as a trademark infringement.

## STRUCTURE OF ASC STANDARDS

A Standard is “a document that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory”.

### **ASC Standards are designed as follows:**

- ASC Standards consist of multiple Principles – a Principle is a set of thematically related Criteria which contribute to the broader outcome defined in the Principle title;
- Each Principle consists of multiple Criteria – each Criterion defines an outcome that contributes to achieving the outcome of the Principle;
- Each Criterion consists of one or several Indicators – each Indicator defines an auditable state that contributes to achieving the Criterion outcome.

Both Principles and Criteria include Rationale statements providing a set of reasons (backed by reference notes if needed) as to why the Principle or Criterion is needed.

## SCOPE AND UNIT OF CERTIFICATION

Linked to the ASC Vision, the Scope of the ASC Trout Standard addresses the key negative environmental and social impacts associated with the Trout aquaculture industry. An ASC-certified farm contributes in reducing, mitigating or eliminating these negative impacts.

The Scope of the Standard is translated into seven Principles that apply to every UoC:

- Principle 1 – Comply with all national and local laws and regulation
- Principle 2 – Conserve habitat and biodiversity
- Principle 3 – Minimise negative effects on water resources
- Principle 4 – Proactively maintain the health of cultured fish and minimise the risk of disease transmission
- Principle 5 – Use resources in an environmentally efficient and responsible manner
- Principle 6 – Be socially responsible
- Principle 7 – Requirements for fingerlings and egg suppliers

The Criteria within the Principles apply to every UoC

### Unit of Certification (UoC)

The applicable UoC is determined by the CAB / auditor and adheres to the Standard's Criteria UoC-requirements as outlined in the CAR. The ASC Freshwater Trout Standard will be audited at the "grow-out" phase of freshwater salmonid farming, defined as production facilities for fish weighing at least 10 grammes. The Standard also includes a set of requirements around the fingerling, egg suppliers and feed inputs.

#### ***Geographic scope to which the Standard applies***

The ASC Freshwater Trout Standard applies to all locations and scales of freshwater trout farm-based aquaculture production systems in the world.

#### ***Species to which the Standard applies***

The ASC Freshwater Trout Standard was originally (v1.0) developed considering farming systems for rainbow trout (*Oncorhynchus mykiss*). However, the current ASC Freshwater Trout Standard (v1.2) is applicable to any salmonid grown in fresh water. Trout raised in saltwater is not covered under the ASC Freshwater Trout Standard, but under the ASC Salmon Standard.

Farms producing salmon smolts produced in cage-culture operating in freshwater bodies need to be certified to the ASC Freshwater Trout Standard (see Section 8) in order to meet the requirements for cage-cultured salmon smolts in freshwater water bodies under the ASC Salmon Standard.

### Metric Performance Levels

Several Indicators in the Standard require a Metric Performance Level (MPL). The applicable MPL is directly listed after the Indicator ("Requirement" section).

## **How to read this document?**

In the following pages, tables with indicators and their corresponding requirements are included. Within each criterion, requirements tables are followed by a rationale section that provides a brief overview of why the issues are important and how the proposed requirements address them.

Definitions are provided in footnotes.

The ASC Trout Standard will be supplemented by an auditor guidance document detailing the methodologies used to determine if the ASC Trout Standard is being met, as well as guidance for producers to achieve compliance to the ASC Trout Standard.

# 1. PRINCIPLE 1: COMPLY WITH ALL NATIONAL AND LOCAL LAWS AND REGULATIONS

*Impact: Principle 1 is intended to ensure that all farms aiming to be certified to the ASC Freshwater Trout Standard meet their legal obligations. Adherence to the law and regulations of the land ensures farms have met basic environmental and social requirements of their country and have legitimate land tenure.*

## 1.1 Criteria: Operate within the legal framework of national and local laws and regulations that are applicable and current

INDICATOR	REQUIREMENT
1.1.1 Presence of documents issued by pertinent authorities indicating compliance with local and national authorities on land and water use	Yes
1.1.2 Presence of documents indicating compliance with tax laws	Yes
1.1.3 Presence of documents indicating compliance with all labour laws and regulations	Yes
1.1.4 Presence of documents indicating compliance with regulations or permits concerning water quality impacts, effluent and water abstraction	Yes

**Rationale** - To assure trout farms are operating legitimately within their region and country, the ASC Freshwater Trout Standard requires confirmation in these focused areas: use rights, tax laws, labour laws and water quality regulations. While indicating compliance with documentation in these four areas does not ensure compliance with all laws and regulations, it is an indicator that a certified farm is aware of and fulfilling its legal responsibilities.

These requirements do not attempt to monitor or enforce local laws and regulations. Some countries have hundreds of relevant laws and regulations. It would not be possible or effective to audit against or enforce national laws and regulations. This principle aims to ensure that certified farms are engaged with and respecting local and national laws and regulations. The areas specifically addressed above were considered to be the key areas within local and national regulations frameworks and legislation.

The overall objective of the ASC Freshwater Trout Standard is to define performance requirements that

will be internationally relevant and shift global production toward better practices. The ASC Freshwater Trout Standard also recognizes that different countries have different levels of regulation and so, in some cases, adhering to national and local legislation is only the initial foundation for compliance with the ASC Freshwater Trout Standard.

## 2. PRINCIPLE 2: CONSERVE HABITAT AND BIODIVERSITY

*Impact: This principle encompasses biodiversity-related impacts resulting from farm siting and operation, such as conversion of eco-sensitive habitats, introduction and cultivation of exotic and transgenic species, and threats to wild populations from escapees and predator control.*

The requirements under Principle 2 draw on international conventions that encourage environmental and economic sustainability simultaneously, such as the Convention on Biological Diversity that was adopted at the 1992 Earth Summit. The requirements place heavy emphasis on conserving biodiversity at the ecosystem, habitat and species levels; conserving ecosystem functions; and attempting to reward proper planning, siting and operation of trout farms based on an integrated ecosystem approach to aquaculture.

### 2.1 Criteria: Siting and location of farms<sup>4</sup>

INDICATOR	REQUIREMENT
2.1.1 Allowance for siting in National Protected Areas <sup>5</sup>	None <sup>6,7</sup>

<sup>4</sup> To determine its compliance with the requirements in 2.1, a producer will need documentation that analyses the farm's siting and surrounding habitats and ecosystems. Documentation can be based on an Environmental Impact Assessment (EIA) or any other credible process of environmental assessment.

<sup>5</sup> A **protected area** is "a clearly defined geographical space, recognised, dedicated and managed through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values." Source: Dudley, N. (Editor) (2008), Guidelines for Applying Protected Area Management Categories, Gland, Switzerland: IUCN. x + 86pp.

<sup>6</sup> An exception is made for protected areas that are classified by the International Union for Conservation of Nature (IUCN) as Category V or VI. These are areas preserved primarily for their landscapes, or areas that include sustainable resource management. Details can be found here: <https://www.iucn.org/theme/protected-areas/about/protected-areas-categories>.

<sup>7</sup> An exception is also made for farms located in protected areas that are designated as such after the farm already was established in that location. In these situations, the farm must demonstrate that its operation is compatible with the objectives of the protected area, and that it is in compliance with any relevant conditions placed on the farm by authorities as a result of the protected designation.



2.1.2 Conversion of wetlands <sup>8</sup> after 1999	None <sup>9</sup>
2.1.3 An assessment of the presence on the farm of species listed on the International Union for Conservation of Nature (IUCN) “Red List of Threatened Species” as vulnerable, near threatened, endangered or critically endangered; an evaluation of the farm’s impact on any such species present; and clearly defined mitigation measures to reduce any negative impacts and allow existence of such species	Yes

**Rationale** - Trout farm siting can influence surrounding ecosystems. Farm siting decisions also should take into consideration Protected Areas, habitat for threatened species and natural wetlands.

National Protected Areas are recognized as a tool in conserving species and ecosystems. They also provide a range of goods and services essential to the sustainable use of natural resources.

The IUCN’s “Red List of Threatened Species” is a global inventory of the conservation status of plant and animal species. A series of “Regional Red Lists,” which are produced by countries or organizations, assess the risk of extinction of species within a given political jurisdiction. The Red Lists use criteria that evaluate extinction risk. The ASC Freshwater Trout Standard focuses on the four categories that confer the greatest risk: near threatened, vulnerable, endangered and critically endangered.

Wetlands provide fundamental ecological services and are sources of biodiversity at species, genetic and ecosystem level. Wetlands constitute a resource of great economic, scientific, cultural and recreational value for communities. Wetlands play a vital role in climate change adaptation and mitigation. Wetlands should be restored and rehabilitated, whenever possible, and conserved by ensuring wise use.

Within the ASC Freshwater Trout Standard, 1999 is the benchmark for the definition and scope of “wetland conservation.” This is the year that the “Convention on Wetlands of International Importance” (also known as the Ramsar Convention) was approved. The convention provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

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<sup>8</sup> **Wetland:** Generally, wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. Wetlands generally include swamps, marshes, bogs and fens (U.S. Environmental Protection Agency).

<sup>9</sup> Exception: Conversion of wetlands for access to water (e.g. canals for inlets and outlets): Converted surface area must be offset by restoration of 100% of the equivalent area of functional wetlands with the same habitat characteristics.

## 2.2 Criteria: Riparian buffer zones<sup>10</sup>

INDICATOR	REQUIREMENT
2.2.1 For new farms installed on land after February 2013 (or for significant expansions), minimum buffer zone between the farm and an adjacent water body in which there is no farm infrastructure that might impede wildlife's access to the water, except for inflow and outflow systems	$\geq 15$ metres from the water's edge <sup>11</sup>

**Rationale** - The zones between water bodies and the adjacent terrestrial ecosystems (i.e., riparian buffers) often serve as habitat for vulnerable or endangered species and, in the case of heavily used landscapes, are the only remaining habitats for many such species. Buffer zones with natural vegetation are also helpful to minimise erosion and run-off, improve water quality of the adjacent water body and help stabilize the ecosystem around the water source.

The ASC Freshwater Trout Standard requires that all new farms be constructed with the minimum natural buffer zone between the farm and a natural watercourse adjacent to a trout farm. The minimum width of a riparian buffer zone is perceived to be 15 metres<sup>12,13,14</sup>.

<sup>10</sup> **Riparian buffer zone:** a vegetated area (a "buffer strip") near a stream, usually forested, which helps shade and partially protect a stream from the impact of adjacent land uses. [https://en.wikipedia.org/wiki/Riparian\\_buffer#cite\\_note-2](https://en.wikipedia.org/wiki/Riparian_buffer#cite_note-2).

<sup>11</sup> An exception is made if the farm can demonstrate through a public third-party scientific analysis that the farm's structures do not impede animal habitats and corridors and do not present erosion risks.

<sup>12</sup> [http://www4.ncsu.edu/~acpierc3/world\\_forestry/](http://www4.ncsu.edu/~acpierc3/world_forestry/).

<sup>13</sup> Riparian Buffer Width, Vegetative Cover, and Nitrogen Removal Effectiveness: A Review of Current Science and Regulations. United States Environmental Protection Agency, 2005. [http://ccrm.vims.edu/education/seminarpresentations/fall2006/Workshop\\_CD/Other\\_References/Riparian\\_Buffers\\_& Nitrogen\\_Removal.pdf](http://ccrm.vims.edu/education/seminarpresentations/fall2006/Workshop_CD/Other_References/Riparian_Buffers_& Nitrogen_Removal.pdf).

<sup>14</sup> Review of Riparian Buffer Zone Effectiveness . MAF Technical Paper No: 2004/05, 2004. [http://www.biol.canterbury.ac.nz/ferg/The%20Mackenzie%20Project/Mackenzie/Information/Riparian\\_buffer\\_zone.pdf](http://www.biol.canterbury.ac.nz/ferg/The%20Mackenzie%20Project/Mackenzie/Information/Riparian_buffer_zone.pdf).

## 2.3 Criteria: Introduction of exotic species<sup>15</sup>

INDICATOR	REQUIREMENT
2.3.1 New introductions of exotic trout after February 2013, unless in a closed production system <sup>16</sup>	None

**Rationale** - Accidental or intentional introductions of non-native species can cause significant global environmental problems with potentially far-reaching social and economic impacts as well<sup>17</sup>.

Aquaculture is considered one of the major pathways for introducing non-native animals that could become invasive and result in biodiversity loss<sup>18,19,20</sup>. Rainbow trout, in particular, is one of the most widely introduced fish species in the world, leading it to be included on a list of the 100 species of greatest concern in the Global Invasive Species Database<sup>21</sup>. Therefore, the ASC Freshwater Trout Standard seeks to discourage the introduction of trout into waterways where these species are not native or previously established.

<sup>15</sup> **Exotic species:** non-native animals living in areas outside their native boundaries.

<sup>16</sup> A **closed production system** is defined as a facility with recirculating (i.e. ≤10% of total water volume is exchanged per day) water that is separated from the wild aquatic medium by effective physical barriers that are in place and well maintained to ensure no escapes of reared specimens or biological material that might survive outside the culture system and subsequently reproduce.

<sup>17</sup> Leung, K.M.Y. and Dudgeon, D. 2008. Ecological risk assessment and management of exotic organisms associated with aquaculture activities. In: M.G. Bondad-Reantaso, J.R. Arthur and R.P. Subasinghe (eds). Understanding and applying risk analysis in aquaculture. FAO Fisheries and Aquaculture Technical Paper. No. 519. Rome, FAO. pp. 67–100. <http://www.fao.org/3/a-i0490e/i0490e01e.pdf>.

<sup>18</sup> **Invasive species:** organisms that successfully establish themselves in and then overcome otherwise intact, pre-existing native ecosystems ([http://www.issg.org/about\\_is.htm](http://www.issg.org/about_is.htm)).

<sup>19</sup> Weigle, S.M., Smith, L.D., Carlton, J.T. & Pederson, J. 2005. Assessing the risk of introducing exotic species via the live marine species trade. *Cons. Biol.*, 19: 213-223.. [https://seagrant.mit.edu/publications/MITSG\\_05-01J.pdf](https://seagrant.mit.edu/publications/MITSG_05-01J.pdf).

<sup>20</sup> Casal, C.M.V. 2006. Global documentation of fish introductions: the growing crisis and recommendations for action. *Biol. Invasions*, 8: 3-11. <https://eurekamag.com/pdf.php?pdf=004435485>.

<sup>21</sup> Global Invasive Species Database ([www.issg.org](http://www.issg.org)).

## 2.4 Criteria: Transgenic<sup>22</sup> Trout

INDICATOR	REQUIREMENT
2.4.1 Allowance for the culture of transgenic trout, including the offspring of genetically engineered trout	None

**Rationale** - The culture of transgenic trout is prohibited under the ASC Freshwater Trout Standard. Invoking the precautionary principle, the ASC Freshwater Trout Standard cannot allow these species to be cultured until there is more conclusive evidence that demonstrates that they pose an acceptable level of risk to adjacent ecosystems.

The culture of genetically enhanced<sup>23</sup> trout is acceptable under the ASC Freshwater Trout Standard. This allows for further progress in feed conversion, disease resistance and environment adaptation (domestication), which should increase the efficient use of local resources. Also allowed under the ASC Freshwater Trout Standard is the cultivation of triploid and sex-reversed trout.

## 2.5 Criteria: Escapes from culture facilities<sup>24</sup>

INDICATOR	REQUIREMENT
2.5.1 Evidence of a well-designed, maintained and managed culture system, infrastructure and	Yes <sup>26</sup>

<sup>22</sup> **Transgenic:** An organism, with the exception of human beings, in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination. Source EFSA.

<sup>23</sup> **Genetic enhancement:** The process of genetic improvement via selective breeding that can result in better growth performance and domestication but does not involve the insertion of any foreign genes into the genome of the animal.

<sup>24</sup> Farms operating a closed system (e.g. RAS) can be excluded from this clause if fish escape possibilities are proven to be impossible.

<sup>26</sup> Guidance given in Appendix IV.

farm management <sup>25</sup> to minimise escapes during stocking, grow-out, grading and harvest.	
2.5.2 The farm shall count all stocked and harvested fish using a counting technology or counting method with an accuracy of ≥98% <sup>27</sup> .	Yes
2.5.3 All fish in net pens/cages shall also be counted during each grading.	Yes
2.5.4 Number of known escapes and unexplained losses <sup>28</sup> are publicly documented and reported to the relevant authorities as well as to ASC on an annual basis.	Yes

**Rationale** - The management practices in this criterion seek to minimise the risk of farmed fish escaping into the wild. Escaped fish are a potential pathway for disease from the farm into the wild, and also can lead to competition for habitat and genetic impacts on wild stocks where native wild stocks of the same species are present.

The requirements require transparency about unexplained loss of freshwater salmonids to help the farm and the public understand trends related to the cumulative numbers of losses of fish that go unnoticed during production. The accuracy of these numbers is limited by the margin of error of fish counting machines and other counting techniques. The requirements seek to encourage farmers to use counting devices that are as accurate as possible, requiring a minimum 98 per cent accuracy of the counting method.

<sup>25</sup> Proper farm management regarding **escape prevention** includes, but is not restricted to:

- 1) assessing potential factors that can result in fish escapes (e.g. siting related to marine navigation, nets with appropriate net strength – including resistance to net biting from farmed fish and predators, net testing and maintenance, nets with appropriate net mesh size, appropriate mooring and cage-system robustness – including protection against floating debris and forecastable weather events, fish handling/transport procedures)
- 2) assessing the risks for the listed risk factors (under 1) and developing Standard Operating Procedures (SOP)
- 3) training staff to be aware of the (potential) risks and to follow escape prevention SOP to minimise escape risk(s)
- 4) record keeping and implementing corrective actions where identified
- 5) reviewing the escape prevention management system on a yearly basis, or when escape events occur, and revise where and when needed.

<sup>27</sup> Accuracy of the counting technology (taken from manufacturer spec sheets) shall be validated and documented (e.g. frequency of hand counts).

<sup>28</sup> Calculated as: Unexplained loss = stocking count - harvest count - mortalities - other known escapes.

## 2.6 Criteria: Predator control<sup>29</sup>

INDICATOR	REQUIREMENT
2.6.1 Intentional use of lethal predator control	None <sup>30</sup>

**Rationale** - In some cases, farmers employ lethal controls to deter or remove predators from their farms. The killing of predators can negatively impact predator populations and affect local biodiversity, especially when local predators (e.g. herons and egrets) become dependent on the reliable food source that trout farms provide. Although a consistent food supply is likely to enhance population numbers, it also is likely to change behaviour and local dispersal patterns of the predatory species that may ultimately affect the health of those populations.

The intentional killing of animals that prey on cultured trout is inappropriate for farms certified under these requirements, and therefore is not allowed.

The ASC recognizes that, on rare occasions, a farm may encounter exceptional circumstances that might merit lethal action against a predator. The requirements, therefore, permit an exception to the prohibition on lethal action in situations where the farm can provide public scientific evidence of an assessment that demonstrates lethal action against a particular predator is appropriate, necessary and presents no risks to wild populations or ecosystems.

This exception cannot be applied to species that are threatened, endangered or critically endangered.

Vermin are classed as distinct from predators for the purposes of this requirement.

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<sup>29</sup> Excluding “vermin” as defined in the local jurisdiction.

<sup>30</sup> The standard permits an exception to the prohibition on lethal action in situations where the farm can provide public evidence of an assessment that demonstrates that lethal action against a particular predator is appropriate, necessary and presents no risks to wild populations or ecosystems. This exception does not apply to species that are threatened, endangered or critically endangered. The assessment must come from an EIA or any other credible process of environmental analysis.

### 3. PRINCIPLE 3: MINIMISE NEGATIVE EFFECT ON WATER RESOURCES

*Impact: Principle 3 is intended to address potential impacts on water quantity and quality related to the establishment and operation of freshwater trout farms. Impacts can be associated with the requirement for a fresh water supply, either surface or ground water or a combination of both, and the quality of water discharged from the farm into the natural environment.*

#### 3.1 Criteria: Land-based systems - Water Use/Abstraction Levels

INDICATOR	REQUIREMENT
<i>Requirements 3.1.1 and 3.1.2 apply to farms utilising surface water (such as water from a river):</i>	
3.1.1 Maximum amount of water that a farm can divert from a natural flowing water body (such as a river or stream)	50% of the natural water body's flow immediately above the farm <sup>31</sup>
3.1.2 Demonstration that ≥ 90% diverted water is returned to the natural water body	Yes
<i>Requirements 3.1.3 and 3.1.4 apply to farms utilising groundwater (such as water from a well):</i>	
3.1.3 All use of underground pumped water has been permitted by regulatory authorities	Yes
3.1.4 Well depths are tested at least annually, and results made publicly available <sup>32</sup>	Yes

**Rationale** - Trout aquaculture facilities utilising flowing water (including recirculating systems) require a constant supply of fresh water. Farms removing or diverting freshwater resources require appropriate

<sup>31</sup> Farms will be exempted from this standard if they can demonstrate that they are in a jurisdiction that regulates the farm's water abstraction based on a minimum vital water flow for the natural water body, and the farm's water use respects that minimum vital flow. Farms would also be exempt if they can demonstrate abstraction amounts respect limits determined by a scientific study that estimates minimum vital flow.

<sup>32</sup> Well depths must be tested at similar times of the year, with results submitted to ASC. Wells that are by law not allowed to be opened are exempt from this indicator.

and effective management to oversee water allocations and ensure efficient utilisation. Trout farms typically make use of groundwater (wells) or surface waters (rivers or streams) as their water source.

Farms that divert water from a river or stream cause a reduction in the water body’s flow for the distance between the farm’s inlet and outlet. It is difficult to set a global requirement that ensures that the remaining flow is sufficient to support the natural flora and fauna. Some jurisdictions are currently setting minimum flow requirements for a river or stream that farms need to respect. This is an appropriate local approach. In the absence of such regulation, or an equivalent scientific study, the ASC Freshwater Trout Standard requires farms to always leave at least half of the natural flow in the water body.

Groundwater requires attention because it represents the abstraction and displacement of typically higher-quality water. Well or aquifer recharge is the process of water being replenished in the ground. When abstraction increases beyond the rate of recharge, the result is a net reduction in the water table.

Groundwater levels vary naturally from year to year, making a rigid global requirement impractical. These requirements instead require a farm to keep track of water tables over time and to make that information public. In addition, all use of underground water must be explicitly permitted to avoid situations in which water use by a farm would be undisclosed to regulators.

It should be noted that a plentiful and sustainable water supply is of critical importance for trout producers; thus, protection of these resources is paramount to the farm’s viability.

### 3.2 Criteria: Land-based systems - Water Quality/Effluent

INDICATOR	REQUIREMENT
3.2.1 Maximum total amount of phosphorus released into the aquatic environment per tonne (t) of fish produced over the previous 12-month period (see methodology in Appendix II-A)	4 kg/t of fish produced
3.2.2 Minimum oxygen saturation in the outflow, measured monthly (see methodology in Appendix II-B)	60% <sup>33</sup>
3.2.3 Macro invertebrate surveys downstream from the farm’s effluent discharge demonstrate benthic health that is similar to or better than surveys upstream from the discharge (see methodology in Appendix II-C)	Yes

<sup>33</sup> If a single oxygen reading is below 60 per cent, the farm would need to demonstrate daily continuous monitoring with an electronic probe and recorder for at least a week with a minimum 60 per cent saturation at all times.



3.2.4 Evidence of implementation of biosolids (sludge); Best Management Practices (BMPs) (see Appendix II-D)	Yes
3.2.5 Water-quality monitoring matrix completed and submitted to ASC (see Appendix II-B)	Yes

**Rationale** - Effluent from trout farms can have an environmental effect on rivers, streams and other bodies of water that receive the discharge. Phosphorus is the key limiting nutrient in most temperate and cool freshwater systems. It is a stable nutrient in that it does not volatilize like nitrogen compounds. It is also added to feeds in proportions that can allow estimations of other waste constituents (organic matter and nitrogen). Thus, phosphorus is an ideal variable to set load limits for freshwater trout aquaculture.

The ASC developed the phosphorus load requirement based on a unit of production, making it an indicator of how well a farm is minimising nutrient discharges per tonne of fish produced. From an environmental standpoint, farms should aim for as low an annual load of phosphorus per tonne of fish as possible. Farms can lower their phosphorus load on the environment by using a better feeding strategy (ratio and feed distribution), improving feed conversion efficiency through the improvement of the environmental conditions in the farm, utilising feed that is more digestible and has lower phosphorus content, and by applying cleaning technologies such as settling ponds and filters. Production facilities are encouraged to develop methodologies to reduce their phosphorus burdens over time, while ensuring farmed fish are getting the appropriate nutrients to protect the nutritional content and health of the trout.

In an attempt to limit the oxygen burden on natural water bodies from the release of nutrients, these requirements include a minimum saturation level of dissolved oxygen at discharge.

Benthic biodiversity is often a measure of aquatic ecosystem health. These requirements use faunal surveys as a reference for a farm's actual impact on the environment. By comparing surveys downstream and upstream from the farm's effluent discharge, the requirement aims to isolate the impact of the production facility, and ensure that no significant impact is occurring.

Biosolids are a mixture of organic waste and sediment produced or accumulated through the farming activity. Biosolids discharged into natural water bodies are of concern because solids can restrict light penetration in water bodies, accumulate downstream, cover plants and habitat and cause general shallowing of water bodies. Additionally, the organic component of biosolids will exert an oxygen demand as the organic matter decays. The simplest and best way to minimise these impacts is to remove sediments from the water column and allow organic matter to decay prior to discharge. Functionally, this infers the use of a settling basin to let solids settle out of the water column, and for bacterial decomposition and oxygen depletion to occur at the same time prior to disposal of biosolids. To provide assurance of appropriate disposal of biosolids, these requirements include a small number of BMPs.

These requirements do not require a specific effluent monitoring regime beyond the dissolve oxygen requirements and benthic analyses. However, the requirements do require farms to submit to the ASC the results of the effluent monitoring they conduct as part of their regulatory requirements. In particular, the requirement requires data on any sampling of phosphorus, nitrogen, total suspended solids (TSS) and biological oxygen demand (BOD). This data will help to distinguish the performance of farms certified by this requirement over time and assist in revisions to the requirement.

### 3.3 Criteria: Cage-Based Systems - Water quality/benthic community

INDICATOR	REQUIREMENT
3.3.1 For cages located on water bodies with a surface area less than 1,000 km <sup>2</sup> , evidence that farm production levels reflect the results of an assimilative capacity study (see Appendix II-E)	Yes
3.3.2 For cages located on water bodies with a surface area of 1,000 km <sup>2</sup> or greater, evidence that cages are located at sites that are classified as “Type 3” sites, as defined in Appendix II-F	Yes
3.3.3 Water quality monitoring matrix completed (see Appendix II-G)	Yes
3.3.4 Maximum baseline total phosphorus concentration of the water body (see Appendix II-H)	≤ 20 µg/L <sup>34</sup>
3.3.5 Minimum per cent oxygen saturation of water 50 centimetres above bottom sediment (at all oxygen monitoring locations described in Appendix II-G)	≥ 50%
3.3.6 Trophic status classification of water body remains unchanged from baseline (see Appendix II-H)	Yes

<sup>34</sup> This concentration is equivalent to the upper limit of the Mesotrophic Trophic Status classification as described in Appendix II-H.

<p>3.3.7 Maximum allowed increase in total phosphorus concentration in lake from baseline</p>	<p>25% for water bodies with a surface area of less than 1,000 km<sup>2</sup></p> <p>15% for water bodies with a surface area of 1,000 km<sup>2</sup> or greater</p>
<p>3.3.8 Maximum total amount of phosphorus released into the environment per metric ton (t) of fish produced over the previous 12-month period (see Appendix II-A)</p>	<p>4 kg/t of fish produced</p>
<p>3.3.9 Allowance for use of permanent aeration systems or other technological means to increase oxygen levels in the water body.</p>	<p>None</p>

**Rationale** - With no mechanism for collection or treatment of fish wastes (solid and dissolved) and uneaten feed, cage-based production systems release nutrients directly into the surrounding water column. Water quality impacts associated with these nutrient releases include increases in primary productivity of the water body and the subsequent reduction in dissolved oxygen levels upon decomposition of organic materials and phytoplankton respiration and increases in TSS, which can limit photosynthesis and oxygen production. Bottom sediment impacts include deposition of solids on the lake bottom, resulting in increases in sediment oxygen demand, habitat destruction and changes to the benthic macroinvertebrate communities.

With respect to water quality, the magnitude of the impact of nutrients from cage-based operations is a function of many factors, including farming practices (feed utilisation, species cultivated and stocking densities), site characteristics such as basin morphology and hydraulic retention time, ambient water quality conditions within the receiving waters and inputs from other sources within the catchment. Because of natural processes in stratified lakes and reservoirs where water bodies can “turn over,” cage-based farms should only be established at sites where there is good mixing of both surface and bottom water and where the hypolimnion is not locally bounded within a water body. Enclosed basins or lakes may only be suitable for a limited level of production as established by an assimilative capacity assessment.

These requirements require a comprehensive assimilative capacity assessment of the water body. The study will determine if cage farming is appropriate in the water body and will set a limit on production and/or nutrient discharge based on the water body’s assimilative capacity. Detailed requirements of this study are provided in Appendix II-E and reflect global best practice. For very large lakes, such as the North American Great Lakes, an assimilative capacity study would not be practical or as relevant. In these situations, farms must be located at sites that are least sensitive to nutrient discharges because

they are exposed to more energetic conditions, have connection to deep offshore waters and don't have hydrodynamically isolated embayment.

On the lake bottom, decreases in oxygen levels are an indication of the degradation. This may be due to a release of organic wastes from the cages. DO levels measured 50 centimetres from the bottom sediments provide a signal of the build-up of organic matter and the risks of oxygen deficiency in the lake bottom.

Water quality in a lake can be assessed in many ways. These requirements focus on phosphorus as a reference for water quality. The ASC recognizes that other indicators, such as nitrogen and biological indicators, are important as well. Phosphorus provided the most practical global proxy for these requirements, despite the challenges of its likely fluctuations during the year.

The requirements require that a farm monitors total phosphorus concentrations to gauge potential changes in water quality over time. Potential increases in concentrations may or may not be the result of farming activities. Regardless of the cause, if total phosphorus concentrations rise to the point that the lake's trophic status changes, or if they rise more than 25 per cent from a baseline, trout production would no longer be certifiable in that lake. Technical advisors to the FTAD have signaled that increases in concentration greater than 25 per cent would cause stresses that would likely result in changes in ecosystem structure and function. For massive lakes such as the North American Great Lakes, a more precautionary threshold is set at 20 per cent, since no assimilative capacity study is required. The ASC expects that these requirements will be refined in subsequent revisions based on additional data and experience.

Cage producers must also meet the same phosphorus discharge requirements as land-based farms, calculated as total phosphorus per metric ton of production. The requirement does not require an analysis of benthic invertebrates because of scientific literature that suggests these studies are not a reliable indicator of farm impacts in a lake<sup>35,36</sup>.

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<sup>35</sup> Moss, B., Johnes, P.J. and Philips, G.L. (1996) The monitoring and classification of standing waters in temperate regions – a discussion and proposed based on a worked scheme for British waters, *Biological Reviews*, 71, 2, 310-339.

<sup>36</sup> Wetzel, R.G. (1990) Land-water interfaces: metabolic and limnological regulators. *Verhandlungen der Vereinigung international theoretische und angewandte Limnologie* 24, 624.

## 4. PRINCIPLE 4: PROACTIVELY MAINTAIN THE HEALTH OF CULTURED FISH AND MINIMISE THE RISK OF DISEASE TRANSMISSION

*Impact: Trout farms that don't implement biosecurity measures and don't maintain their aquatic environment in optimum condition pose an increased risk to wild populations through disease transfer and amplification. Stressful conditions on farmed fish increase risks of disease outbreaks that can affect both farmed and wild species. The excessive or improper use of disease and/or parasite treatments can have toxic impacts on wild populations or alter habitats.*

### 4.1 Criteria: Farm health management

INDICATOR	REQUIREMENT
4.1.1 Evidence of an implementation of a site-specific farm health plan that is reviewed at least annually and addresses, as a minimum, biosecurity, veterinary health and crisis management.	Yes
4.1.2 All fish, at all stages in the life cycle, are sourced from a supply that is of equal or better health status than its own stock	Yes
4.1.3 All fish that are moved off site, at all stages in the life cycle, are moved to a location of equal or lesser health status	Yes
4.1.4 Site access, disinfection and hygiene protocols are implemented and annually reviewed	Yes
4.1.5 Bio-secure disposal of all mortalities and fish trimmings	Yes
4.1.6 Immediate investigation of all mortality events on site and, in instances where mortality remains unexplained or unattributed, further investigation with fish health professionals off site	Yes

4.1.7	Minimum frequency of inspection of the farm by a designated veterinarian <sup>37</sup> who is specialized in aquatic animal health. The inspection must review the farm health plan.	≥ 1 inspection per year, at a time when the site is in production
4.1.8	Evidence that maximum stock density was determined jointly by the designated veterinarian	Yes

**Rationale** - Creating and implementing risk-based farm management protocols (e.g. health management plans, biosecurity plans and crisis procedures) and maintaining daily records on fish health and behaviour are important tools for keeping farmed fish healthy and for minimising or eliminating the impact trout farming can have on the aquatic environment. For example, a veterinary health plan can help reduce the disease risk load of any farm stock to a minimum level. Therefore, it is critical for these documents to be created and for all producers to be aware of the documents and understand their role in implementing them. Documentation must be backed up by site visits from a designated veterinarian who can critically review the efficacy of any farm health management protocols.

## 4.2 Criteria: Chemicals and treatments

	INDICATOR	REQUIREMENT
4.2.1	Presence of a treatment plan, treatment record book and farm health history that includes a detailed recording of all treatments and all health events on the farm, as well as written veterinary prescriptions and receipts	Yes
4.2.2	Use of therapeutic treatments, including antibiotics or other treatments, that are banned under European Union (EU) law	Not permitted

<sup>37</sup> A **designated veterinarian** is the professional responsible for health management on the farm who has the legal authority to diagnose disease and prescribe medication. He/she is expected to have a degree in veterinary medicine and a strong background in fish disease control. In some countries such as Norway, a fish health biologist or other professional has equivalent professional qualifications and is equivalent to a veterinarian for purposes of these standards. This definition applies to all references to a veterinarian throughout the standards document.

4.2.3 Prophylactic use of antimicrobial treatments (excluding <i>pre</i> biotics and <i>pro</i> biotics that have been approved by a regulatory process that included a risk assessment) <sup>38</sup>	Not permitted
4.2.4 Public disclosure of all antimicrobial treatments used on the farm	Yes
4.2.6 Allowance for use of antibiotics listed as critically important for human medicine by the WHO <sup>39</sup>	None <sup>40,41</sup>
4.2.7 Proactive vaccination against diseases that present a risk in the region and for which an effective, legally authorized and commercially viable vaccine exists, as determined by the farm's designated veterinarian	Yes

**Rationale** - The use of certain therapeutic treatments may impact human health or have a damaging effect on the aquatic environment, both in terms of water quality and direct impact on flora and fauna. Since there is no single global list of banned treatments, these requirements have adopted EU regulation as a source for a list of banned treatments because of the significant experience of EU regulatory agencies.

Prophylactic use of antimicrobial treatments may lead to excessive or unnecessary treatments, increasing the risks of development of antibiotic-resistant bacterial strains. In addition, the ASC is concerned about the use of antimicrobial treatments that are listed as “critically important” for human health by the World Health Organization. In future revisions of the standard, the ASC expects to address how to restrict the use of critically important antimicrobial treatments. In the meantime, these

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<sup>38</sup> The washing of eggs is permitted under this Standard.

<sup>39</sup> The fifth edition of the WHO list of “Critically important antimicrobials for human medicine” was published in 2017 and is available at: <http://apps.who.int/iris/bitstream/10665/255027/1/9789241512220-eng.pdf?ua=1>.

<sup>40</sup> If the antibiotic treatment is applied to only a portion of the pens on a farm site, fish from pens that did not receive treatment are still eligible for certification.

<sup>41</sup> An exception is made for the use of oxolinic acid.

requirements require certified farms to make public all applications of antimicrobial treatments to better inform interested parties about the extent of use.

Vaccination reduces the necessity for therapeutic treatments, thereby reducing potential impacts. The ASC strongly encourages the use of vaccines to minimise disease risks.

## 5. PRINCIPLE 5: USE RESOURCES IN AN ENVIRONMENTALLY EFFICIENT AND RESPONSIBLE MANNER

*Impact: The culture of trout requires the use of resources (other than water) that include feed inputs (e.g. wild-forage fisheries, terrestrial plant and animal protein), non-therapeutic chemical inputs and consumables (e.g. building supplies and fuel), etc. Extraction, production and/or consumption of these resources have the potential to negatively impact marine and terrestrial ecosystems.*

These feed requirements require a trout producer to work with its feed supplier(s) to demonstrate compliance. The ASC Freshwater Trout Standard permits two methods for demonstrating compliance with the requirements. One method requires the farm to buy feed that contains the ingredients as specified in these requirements and provide an auditor with third-party documentation that the manufacturing process did indeed produce this special feed for the farmer.

Farmers also have a second option, commonly referred to as the “mass-balance approach.” With this option, the farm’s feed manufacturer must demonstrate, using a third-party audit, that it purchased the appropriate amount and type of ingredients to supply feed to all its customers requesting specific ingredients through schemes such as the FTAD. These ingredients, however, would be mixed into the general silos and production lines of the manufacturer, greatly reducing costs associated with special storage capacity and production lines. This mass-balance approach is commonly used in other certification schemes and in situations such as purchasing “green” energy off an electricity grid. Ingredients that could be included in a mass-balance approach are primary fishmeal and fish oil inputs, as well as vegetable ingredients such as soy.

### 5.1 Criteria: Traceability and transparency of raw materials in feed

INDICATOR	REQUIREMENT
5.1.1 Evidence of traceability, demonstrated by the feed producer, of feed ingredients that make up more than 1% of the feed <sup>42</sup>	Yes

<sup>42</sup> Traceability should be at a level of detail that permits the feed producer to demonstrate compliance with the standards in this document (i.e., marine raw ingredients must be traced back to the fishery, soy to the region grown, etc.). Feed manufacturers will need to supply the farm with third-party documentation of the major ingredients covered under this standard (e.g. marine ingredients, soy).



5.1.2 Presence of a list of all ingredients that make up more than 1% of the feed	Yes
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**Rationale** - Traceability of raw materials is required to ensure their authentic origin. Traceability is a necessary first step to comply with the feed requirements under this Principle.

The farmer also must have full knowledge of all major ingredients used in the feed, particularly such ingredients as land-animal by-products.

These requirements assume that a farm will work closely with its feed supplier to obtain copies of the necessary records. In-person auditing will occur only on the farm, not at the feed manufacturing facility.

## 5.2 Criteria: Responsible origin of marine raw materials

INDICATOR	REQUIREMENT
5.2.1 Fishmeal and fish oil used in feed that comes from fisheries <sup>43</sup> certified under a scheme that is ISEAL-accredited and has guidelines that specifically promote responsible environmental management of small pelagic fisheries	Not required <sup>44</sup>
5.2.2 Prior to 100% achievement of 5.2.1, the Fishsource <sup>45</sup> score required for the fisheries from which marine raw material in feed is derived (excluding trimming and by-products)	All individual scores $\geq 6$ , and “Current Health” score $\geq 6$
5.2.3 Prior to 100% achievement of 5.2.1, demonstration of chain of custody and traceability for fisheries products in feed through an ISEAL-accredited or ISO 65-compliant certification scheme that incorporates the United Nations Food and Agriculture Organization’s “Code of Conduct for Responsible Fisheries”	Yes

<sup>43</sup> This standard applies to fishmeal and oil from forage fisheries and not to by-products or trimmings used in feed.

<sup>44</sup> See **ASC Feed Interim Solution** - [https://www.asc-aqua.org/wp-content/uploads/2017/07/ASC-Feed-Interim-solution-Marine-Ingredients\\_FINAL\\_20161213.pdf](https://www.asc-aqua.org/wp-content/uploads/2017/07/ASC-Feed-Interim-solution-Marine-Ingredients_FINAL_20161213.pdf) .

<sup>45</sup> Fishsource scores and their methodology are available here <https://www.fishsource.org> and [https://www.fishsource.org/search?query=.](https://www.fishsource.org/search?query=)

5.2.4 Evidence that by-product feed ingredients do not come from fish species that are categorized as vulnerable<sup>46</sup>, endangered or critically endangered according to the IUCN Red List of Threatened Species<sup>47</sup>

Yes

**Rationale** - Wild fish harvested from the ocean and reduced into fishmeal and fish oil are an important component of trout feeds. Demand for these wild pelagic fish resources is increasing as the aquaculture industry expands and as forage fish are increasingly consumed by humans or by other industries including other animal production. There is concern that higher demand could lead to the overfishing and collapse of small forage fish stocks. Wild small pelagic fish play a critical role in the ecosystem and the marine food chain.

These indicators strive to ensure that marine-based feed ingredients come from responsible sources. A main concept of the proposed requirements is to align industry incentives to support processes that will lead to improved fisheries management, and then certification of forage fisheries.

In the long term, the requirements will require marine ingredients in feed to be certified by a widely recognized authority. This recognized authority must be accredited by the ISEAL Alliance, which promotes transparent, multi-stakeholder standard-setting processes. The authority also must specifically address the challenges of small pelagic fisheries. Currently, the Marine Stewardship Council (MSC) is the only scheme that is ISEAL-accredited, and MSC is in the process of developing specific requirements for small pelagic fisheries. Additional schemes may emerge in the future that meet these requirements.

Given the current lack of certified sources of fishmeal and fish oil, the ASC Freshwater Trout Standard uses two interim requirements to immediately promote steps toward responsible sourcing. First, Fishsource provides scores on many fisheries that can be roughly equated to the scoring system of MSC. Second, requirement 5.2.3 seeks to have feed suppliers use the International Fishmeal and Fish Oil Organization (IFFO) Responsible Sourcing standard or a future equivalent that might emerge. Under no circumstances do these requirements expect the interim feed requirements to continue beyond the five-year time horizon envisioned in this document, as they are insufficiently rigorous as a medium-term goal.

The ASC Freshwater Trout Standard recognizes that reaching the five-year goal may be challenging and expects these requirements will serve as an incentive for more fisheries to seek certification. The ASC Freshwater Trout Standard encourages stakeholders to review how the feed industry is progressing toward the five-year goal about two years before the milestone.

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<sup>46</sup>An exception is made for sub-populations of “vulnerable” species that can demonstrate healthy populations through a fishery certified by the Marine Stewardship Council, or approved by the technical committee of the IFFO Responsible Sourcing standard.

<sup>47</sup>The IUCN reference can be found at <http://www.iucnredlist.org/>

These requirements support the use of marine trimmings and by-products, as long as they do not come from endangered or vulnerable fisheries. For species classified as “vulnerable,” which is the lowest level of risk on the IUCN Red List, an exception is made for subpopulations that can demonstrate healthy status through an MSC-certified fishery or an approval by the IFFO Responsible Sourcing technical committee.

### 5.3 Criteria: Dependency on wild-caught<sup>48</sup> marine ingredients in feed<sup>49</sup>

INDICATOR	REQUIREMENT
5.3.1 Fishmeal Forage Fish Dependency Ratio (FFDRm) for grow-out (calculated using formulas in Appendix III, subsection 1)	≤1.5
5.3.2 Compliance with one of the two following requirements: <ul style="list-style-type: none"> <li>a) Fish Oil Forage Fish Dependency Ratio (FFDRo) for grow-out (calculated using formulas in Appendix III, subsection 1), or,</li> <li>b) Maximum level of EPA/DHA content from marine sources as a percentage of fatty acids in the feed (excluding EPA/DHA from trimmings and by-products)</li> </ul>	a) ≤2.95  or  b) ≤ 9%

#### Rationale

There is concern that today’s limited supply of marine ingredients from small pelagic fisheries must be shared across an expanding aquaculture industry and other users, including direct human consumption. The ratios defined in this requirement will encourage farmers to use limited marine resources sparingly and enable the industry to produce more without putting additional pressure on fisheries.

The ratios complement the requirements described in criterion 5.2, which will move farms toward using feed with marine ingredients from fisheries certified as responsibly managed. Given the relatively finite

<sup>48</sup> **Non-fish sources of EPA/DHA** (e.g. derived from algae or yeast culture) are exempt from compliance against indicator 5.3.2.

<sup>49</sup> The FFDR requirements are calculated for fish weighing at least 10 grammes (depending on the weight of fish at entry into the farm).

amount of marine ingredients, trout producers and the aquaculture industry in general will need to continue to reduce their dependency ratios should they wish to continue expanding.

## 5.4 Criteria: Responsible origin of non-marine raw materials in feed

INDICATOR	REQUIREMENT
5.4.1 Presence and evidence of a responsible sourcing policy for the feed manufacturer for feed ingredients that comply with internationally recognized moratoriums and local laws <sup>50</sup>	Yes
5.4.2 Percentage of soy ingredients that are certified by the Roundtable on Responsible Soy, or equivalent <sup>51</sup>	100% after February 2018
5.4.3 Disclosure by the feed supplier of any ingredients that contain more than 0.9% transgenic <sup>52</sup> plant material	Yes
5.4.4 Disclosure by the farm to the direct purchasers of its harvested fish of any feed ingredients that have contained more than 0.9% transgenic material	Yes

### Rationale

The ASC Freshwater Trout Standard aims to promote responsible sourcing of all terrestrial feed ingredients and, in particular, exclude feed ingredients that are sourced from areas where significant ecological damage has occurred. Producers are required to provide evidence that they are purchasing from feed manufacturers that have a responsible sourcing policy for feed ingredients that, at a minimum, demonstrates no ingredients come from areas with moratoriums, such as the Amazon soy moratorium.

<sup>50</sup> Specifically, the policy shall include that vegetable ingredients, or products derived from vegetable ingredients, must not come from the Amazon Biome as geographically defined by the Brazilian Soya Moratorium.

<sup>51</sup> The technical governance structure of the ASC must approve any other certification scheme as equivalent.

<sup>52</sup> **Transgenic:** An organism, with the exception of human beings, in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination. Source EFSA.

A responsibility policy provides a layer of accountability for trout producers and enables them to use their purchasing preferences to reward feed suppliers who support responsible practices (e.g. organic feed ingredients or soy grown using certain practices).

In addition, these requirements support the Roundtable on Responsible Soy as the best available certification process known at this time for sourcing soy. Since the scheme is just now starting to certify soy, the requirements allow five years for feed manufacturers to develop their supply chains.

Transgenic plants are commonly used in aqua feeds throughout the world. Some consumers and retailers want to know if food products are themselves genetically modified organisms (GMOs), or if their purchases support the production of GMOs as feed for the animal products they are purchasing. By ensuring transparency around any transgenic material used in the feed, the requirements support informed choices by retailers and consumers.

The ASC Freshwater Trout Standard does not preclude the use of land-animal by-products in fish feed. These requirements assume that feed producers are following relevant regulations around food safety when incorporating land- animal by-products into feed. Retailers or importing countries remain free to formulate their own requirements in relation to use of land-animal by-products in feeds.

## 5.5 Criteria: Energy consumption and greenhouse gas emissions (on farm)

INDICATOR	REQUIREMENT
5.5.1 Presence of records and evidence of all energy consumption on the farm (including electric power and fuels) and evidence of an energy use assessment of on-farm energy consumption, measured in kilojoule/t fish/year	Yes

### Rationale

Climate change represents perhaps the largest environmental challenge facing our global ecosystem. Because of this, energy consumption used in food production has become a major source of concern. The ASC Freshwater Trout Standard recognizes the importance of efficient and responsible energy use. Therefore, these indicators will require that energy consumption in the production of fish be monitored on a continual basis and that growers should develop means to improve efficiency and reduce consumption of energy, particularly those that are limited or carbon-based. Energy assessments are a new area for producers. Requiring that producers conduct these assessments will raise awareness and build capacity for documentation. In the future, the ASC Freshwater Trout Standard anticipates that this capacity will be leveraged to include a requirement stipulating thresholds for energy use or GHG emissions per unit of production.

## 5.6 Criteria: Non-therapeutic chemical inputs

INDICATOR	REQUIREMENT
5.6.1 Percentage of combustibles contained in waterproof bunds	100%
5.6.2 Percentage of chemicals stored in impermeable containers or buildings	100%
5.6.3 Percentage of used lubricants recycled or turned over to a waste management company	100%
5.6.4 Percentage of chemical containers turned over to a waste management company	100%
5.6.5 Percentage of non-hazardous, non-recyclable wastes turned over to a waste management company or landfill <sup>53</sup>	100%
5.6.6 Demonstration that a farmer is aware of recycling facilities that are accessible to the farm and demonstration of a commitment to use those facilities	Yes

**Rationale** The construction and operation of trout farms can involve the use of hazardous chemicals (e.g. combustibles, lubricants and fertilizers) and the generation of waste. The storage, handling and disposal of such hazardous materials must be done responsibly, according to their respective potential impacts on the environment and human health. Quantifiable indicators have been proposed that imply the implementation of a management plan and the separation of wastes, depending on their destination. The requirement for the percentage of recycled waste reflects the fact that some farms are in extremely remote locations with no viable recycling systems nearby. Still, it is important to set a minimum percentage of recycled waste in the requirements, understanding that many farms may be able to greatly exceed that minimum.

<sup>53</sup> In case of absence of a managed landfill in the area, farms are allowed to bury non-hazardous solid wastes on site, provided all precautions have been taken to prevent the contamination of surrounding surface and underground waters. Wastes that are not biodegradable must not be burned on site because of the possible emissions of toxic gases.

## 6. PRINCIPLE 6: BE SOCIALLY RESPONSIBLE

*Impact: This Principle addresses key labour issues outlined by the ILO, including freedom of association, the right to collective bargaining, freedom from discrimination, fair wages and working hours, safe working conditions and non-abusive disciplinary practices. It also addresses a farm's interaction with local communities, including impacts on livelihoods, cultural institutions and access to natural resources.*

NOTE: A farm does not have to adopt the ASC Freshwater Trout Standard's labour requirements if it can demonstrate compliance with SA 8000 (a Social Accountability International labour certification programme) or an equivalent labour certification scheme that is accredited by ISEAL.

### 6.1 Criteria: Child labour

INDICATOR	REQUIREMENT
6.1.1 Number of incidences of child <sup>54</sup> labour <sup>55</sup>	None

#### Rationale

Adherence to the child labour codes and definitions included in this section indicates compliance with what the ILO and international conventions generally recognise as the key areas for the protection of child and young workers<sup>56</sup>. Children are particularly vulnerable to economic exploitation, due to their inherent age-related limitations in physical development, knowledge and experience. Children need adequate time for education, development and play and, therefore, shall never be exposed to work or working hours that are hazardous<sup>57</sup> to their physical or mental well-being. These protections are equally applicable to children who are paid workers and to children who are unpaid but their labour contributes to their families' and their own welfare. To this end, the requirements related to what constitutes child labour will protect the interests of children and young workers in certified aquaculture operations.

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<sup>54</sup>**Child:** Any person under 15 years of age. A higher age would apply if the minimum age law of an area stipulates a higher age for work or mandatory schooling.

<sup>55</sup>**Child labour:** Any work by a child younger than the age specified in the definition of a child.

<sup>56</sup>**Young worker:** Any worker between the maximum age of a child, as defined above, and under the age of 18.

<sup>57</sup>**Hazard:** The inherent potential to cause injury or damage to a person's health (e.g., being unequipped to handle heavy machinery safely and unprotected exposure to harmful chemicals). Hazardous work: Work that, by its nature or circumstances in which it is carried out, is likely to harm the health, safety or morals of workers.

## 6.2 Criteria: Forced, bonded or compulsory labour

INDICATOR	REQUIREMENT
6.2.1 Number of incidences of forced <sup>58</sup> , bonded <sup>59</sup> or compulsory labour	None

### Rationale

Forced labour—such as slavery, debt bondage and human trafficking—is a serious concern in many industries and regions of the world. Ensuring that contracts are clearly articulated and understood by employees is critical to determining that labour is not forced. The inability of a worker to freely leave the workplace and/or an employer withholding original identity documents of workers are indicators that employment may not be at will. Employees shall always be permitted to physically leave the workplace and to manage their own personal time. Employers are never permitted to withhold original worker identity documents. Adherence to these policies shall indicate an aquaculture operation is not using forced, bonded or compulsory labour forces.

## 6.3 Criteria: Discrimination<sup>60</sup> in the work environment

INDICATOR	REQUIREMENT
6.3.1 Evidence of proactive antidiscrimination practice <sup>61</sup>	Yes

<sup>58</sup> **Forced (Compulsory) Labour:** All work or service that is extracted from any person under the menace of any penalty for which a person has not offered himself/herself voluntarily or for which such work or service is demanded as a repayment of debt. “Penalty” can imply monetary sanctions, physical punishment or the loss of rights and privileges or restriction of movement (e.g., withholding of identity documents).

<sup>59</sup> **Bonded labour:** When a person is forced by the employer or creditor to work to repay a financial debt to the crediting agency.

<sup>60</sup> **Discrimination:** Any distinction, exclusion or preference that has the effect of nullifying or impairing equality of opportunity or treatment. Not all distinction, exclusion or preference constitutes discrimination. For instance, a merit- or performance-based pay increase or bonus is not, by itself, discriminatory. Positive discrimination in favour of people from certain underrepresented groups may be legal in some countries.

<sup>61</sup> Employers shall have written **antidiscrimination policies** stating the company does not engage in or support discrimination in hiring, remuneration, access to training, promotion, termination or retirement based on race, caste, national origin, religion, disability, gender, sexual orientation, union membership, political affiliation, age or any other condition that may give rise to discrimination.



6.3.2 Number of incidences of discrimination

None

**Rationale** - Unequal treatment of employees based on certain characteristics (e.g. sex or race) is a violation of the workers' human rights. Additionally, widespread discrimination in the working environment can negatively affect overall poverty and economic development rates.

Discrimination occurs in many work environments and takes many forms. In order to ensure that discrimination does not occur at certified aquaculture farms, employers must prove their commitment to equality with an official antidiscrimination policy, a policy of equal pay for equal work, as well as clearly outlined procedures to raise, file and respond to a discrimination complaint in an effective manner. Evidence, including worker testimony, of adherence to these policies and procedures will indicate minimisation of discrimination. The combination of both proactive antidiscrimination policies and procedures and auditor-verified worker testimony confirmation of antidiscrimination practices in the workplace is the strongest indication that a certified aquaculture farm of any size is not discriminating in the work environment.

#### 6.4 Criteria: Work environment health and safety

INDICATOR	REQUIREMENT
6.4.1 Percentage of workers trained in health and safety practices, procedures and policies	100%
6.4.2 Evidence that health- and safety-related accidents are recorded and corrective actions are taken	Yes
6.4.3 Proof of company accident insurance covering employee costs stemming from a job-related accident or injury when not covered under national law	Yes
6.4.4 Workers use and have access to appropriate personal protective equipment (PPE)	Yes
6.4.5 Evidence of a health and safety assessment of site facilities and processes	Yes

**Rationale** - A safe and healthy working environment is essential for protecting workers from harm. It is critical for a responsible aquaculture operation to minimise these risks. One of the key risks to employees is hazards resulting in accidents and injury. Consistent and effective employee training in health and safety practices is an important measure for preventing accidents and injuries. All training and information must be provided in an appropriate language. When an accident, injury or violation occurs, the company must record it and take corrective action to identify the root causes of the incident, remediate and take steps to prevent future occurrences of similar incidents. This addresses violations and the long-term health and safety risks. Finally, while many national laws require that employers assume responsibility for job-related accidents and injuries, not all countries require this and not all employees (including, in some cases, migrant workers) will be covered under such laws. When not covered under national law, employers must prove they are insured to cover 100 per cent of employee costs in a job-related accident or injury.

## 6.5 Criteria: Wages

INDICATOR	REQUIREMENT
6.5.1 The percentage of employees who are paid a basic needs wage <sup>62</sup> .	100%
6.5.2 Evidence of transparency in wage setting	Yes

**Rationale** - Workers shall be paid fair and equitable wages that, at a minimum, meet the legal and industry-standard minimum basic needs<sup>63</sup> of workers and provide some discretionary income. A legal minimum wage will be considered a basic needs wage if it is set in a manner consistent with the intent of ensuring that basic needs are met. In instances where there is no legal minimum wage, or a legal minimum that is not set in the spirit of a basic needs wage, the auditor must determine an appropriate proxy for basic needs.

Certified aquaculture operations shall also demonstrate their commitment to fair and equitable wages by having and sharing a clear and transparent mechanism for wage setting and a labour conflict resolution policy that tracks wage-related complaints and responses. Payments shall be made in a manner convenient to workers. Having these policies outlined in a clear and transparent manner will empower the workers to negotiate effectively for fair and equitable wages that will, at a minimum, satisfy

<sup>62</sup> **Basic needs wage:** Enables workers to support the average-sized family above the poverty line, based on local prices near the workplace. Basic needs include essential expenses (e.g., food, clean water, clothes, shelter, transportation and education), a discretionary income, as well as legally mandated social benefits (e.g., health care, medical insurance, unemployment insurance and retirement).

<sup>63</sup> A **legal minimum wage** will be considered a basic needs wage if it is set in a manner consistent with the intent of ensuring basic needs are met. In instances where there is no legal minimum wage, or a legal minimum that is not set in the spirit of a basic needs wage, the auditor must determine an appropriate proxy for basic needs.

basic needs. Revolving labour contract schemes designed to deny long-time workers full access to fair and equitable remuneration and other benefits are prohibited

## 6.6 Criteria: Access to freedom of association and the right to collective bargaining<sup>64</sup>

INDICATOR	REQUIREMENT
6.6.1 Incidences of employees denied freedom to associate, the ability to bargain collectively or denied access to representatives, or representative organizations, chosen by workers	0

### Rationale

Having the freedom to associate and bargain collectively is a critical right of workers, as it allows them to have a more balanced power relationship with employers when doing such things as negotiating fair compensation. Although this does not mean all workers of a certified trout farm must be in a trade union, or even the same trade union or a similar organization, workers must not be prohibited from accessing the organizations of their choice when they exist. If they do not exist or are illegal, companies must make it clear that they are willing to engage in a collective dialogue through a representative structure freely elected by the workers.

## 6.7 Criteria: Disciplinary practices

INDICATOR	REQUIREMENT
6.7.1 Incidences of abusive disciplinary actions	None
6.7.2 Evidence of non-abusive disciplinary policies and procedures whose aim is to improve the workers' performance <sup>65</sup>	Yes

<sup>64</sup> **Bargain collectively:** A voluntary negotiation between employers and organisations of workers to establish the terms and conditions of employment by means of collective (written) agreements.

<sup>65</sup> If disciplinary action is required, progressive verbal and written warnings shall be engaged. The aim should always be to improve the worker before letting him/her go, (indicated by policy statements as well as evidence from worker testimony.)

## Rationale

The rationale for discipline in the workplace is to correct improper actions and maintain effective levels of employee conduct and performance. However, abusive disciplinary actions can violate workers' human rights. The focus of disciplinary practices shall always be on the improvement of the workers' performance. A certified trout farm shall never employ threatening, humiliating or punishing disciplinary practices that negatively impact workers' physical and mental<sup>66</sup> health or dignity. At the same time, employers should demonstrate that they have non-abusive disciplinary practices and procedures in place, as described in the accompanying guidance. Worker testimony will assist auditors in assessing farms around this requirement.

## 6.8 Criteria: Overtime and working hours

INDICATOR	REQUIREMENT
6.8.1 Violations or abuse of working hours <sup>67</sup> and overtime <sup>68</sup> laws and agreements	None

## Rationale

Abuse of overtime working hours is a widespread issue in many industries and regions. Workers subject to extensive overtime can suffer consequences in their work-life balance and are subject to higher fatigue-related accident rates. In accordance with better practices, employees in certified aquaculture operations are permitted to work—within defined guidelines—beyond normal work week hours but must be compensated at premium rates<sup>69</sup>. Requirements for time off, working hours and compensation rates, as described elsewhere in this principle, should reduce the impacts of overtime.

## 6.9 Criteria: Interactions with communities

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<sup>66</sup> **Mental** abuse: Characterised by the intentional use of power, including verbal abuse, isolation, sexual or racial harassment, intimidation or threat of physical force.

<sup>67</sup> **Working hours** (a.k.a. normal work week) can be defined by law but shall not exceed 48 hours on a regular basis (i.e. constantly or the majority of the time). Variations based on seasonality may apply but personnel shall be provided with at least one day off in every seven-day period.

<sup>68</sup> All **overtime** shall be paid at a premium and should not exceed 12 hours per week. In the case of exceptional or emergency events, additional overtime hours are permitted. In such exceptional cases, which must pose an acute and long-term threat to the farm, workers will receive a premium wage and an equal amount of time off in addition to normal time off. Overtime work shall be voluntary, except in cases where it is legal and in which there is a collective bargaining agreement in place that permits compulsory overtime in order to meet short-term business demands.

<sup>69</sup> **Premium rate:** A rate of pay higher than the regular work week rate. Must comply with national laws/regulations and/or industry standards.

INDICATOR	REQUIREMENT
6.9.1 For new farms, evidence of engagement and proactive consultation with surrounding communities, including native and/or indigenous communities about potential social impacts <sup>70</sup> from the farm as required by relevant local and/or national laws and regulations	Yes
6.9.2 Evidence of regular proactive communication, engagement and consultation with surrounding communities, including native and/or indigenous communities	Yes
6.9.3 Evidence of an operational grievance and conflict resolution mechanism to address community concerns	Yes

### Rationale

These requirements are informed by the ISEAL “Code of Good Practice for Assessing the Impacts of Social and Environmental Standards Systems” and a livelihood framework that analyses the objectives, scope and priorities for development.

The requirements aim to ensure that new farms engage surrounding communities in a discussion around potential social impacts from the farm. In addition, all farms must demonstrate regular communication with communities and a transparent process for handling complaints. While these mechanisms will vary depending on the scale of the trout operation and the extent of community participation in the farm, open communication and transparency are required.

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<sup>70</sup> Evidence could include minutes from community meetings and a log of communications with stakeholders. Social impacts to be discussed would likely include economic impacts, natural resource access and use, human health and safety issues, and changes to physical infrastructure and cultural issues, with a particular focus on impacts to indigenous people, where applicable.

## PRINCIPLE 7: REQUIREMENTS FOR FINGERLING AND EGG SUPPLIERS

A farm seeking certification must have documentation from all of its fingerling and egg suppliers to demonstrate compliance with the following requirements. The requirements are, in general, a subset of the requirements in Principles 1 through 6, focusing on the impacts that are most relevant for this stage of production.

INDICATOR	REQUIREMENT
7.1 Presence of documents issued by pertinent authorities proving compliance with local and national authorities on land and water use, effluent regulations and use of treatments	Yes
7.2 New introductions of exotic species from the date of publication of the ASC Freshwater Trout Standard, unless the hatchery/fingerling facility is a closed production system <sup>71</sup>	None
7.3 Allowance for siting in National Protected Areas <sup>72</sup>	None <sup>73,74</sup>
7.4 Evidence of an assessment of the property for	Yes

<sup>71</sup>A **closed production system** is defined as a facility with recirculating water that is separated from the wild aquatic medium by effective physical barriers that are in place and well maintained to ensure no escapes of reared specimens or biological material that might survive and subsequently reproduce.

<sup>72</sup>A **protected area** is “A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.” Source: Dudley, N. (Editor) (2008), Guidelines for Applying Protected Area Management Categories, Gland, Switzerland: IUCN. X + 86pp.

<sup>73</sup>An exception is made for protected areas that are classified by IUCN, or the International Union for Conservation of Nature, as Category V or VI. These are areas preserved primarily for their landscapes, or areas that include sustainable resource management. Details can be found here: [http://www.iucn.org/about/work/programmes/pa/pa\\_products/wcpa\\_categories/](http://www.iucn.org/about/work/programmes/pa/pa_products/wcpa_categories/) .

<sup>74</sup>An exception is also made for farms located in protected areas that are designated as such after the farm already exists in that location. In these situations, the farm must demonstrate that its operation is compatible with the objectives of the newly protected area, and that it is in compliance with any relevant conditions placed on the farm as a result of the designation.

	the presence of species listed on the International Union for Conservation of Nature (IUCN) “Red List of Threatened Species” as vulnerable, near threatened, endangered or critically endangered; an evaluation of the farm’s impact on any such species present; and clearly defined mitigation measures to reduce any negative impacts and allow existence of such species	
7.5	Evidence that the egg and fingerling producer must have an equivalent or better health status than that of the grow-out facility, and must follow all national and local (jurisdictional) guidance on disease management	Yes
7.6	Evidence of disclosure to the grow-out farm of all chemical and antibiotic treatments on eggs and fry, including the reason for their use and the quantity used	Yes
7.7	Allowance for the use of therapeutic treatments, including antibiotics or other treatments, that are banned under European Union (EU) law	Not permitted
7.8	Presence of a fish health management plan implemented in agreement with the facility’s designated veterinarian	Yes
7.9	Evidence of company-level policies and procedures that demonstrate the company’s commitment to each of the 8 key ILO labour issues described in Principle 6	Yes
7.10	Evidence of regular communication, engagement and consultation with surrounding communities	Yes

### Rationale

The production of trout eggs and fingerlings can involve some of the same potential environmental and social impacts as a grow-out site. These 10 requirements focus on the priority issues for this stage of production. These issues include assuring the facility is complying with local regulations, appropriate

siting, introduction of exotic species, health and biosecurity management, treatments, respect for ILO labour requirements and being a responsible neighbour.

The grow-out facility seeking certification will need to work with its fingerling and/or egg supplier(s) to collect the necessary documentation that demonstrates compliance with these requirements. Auditors will not visit the fingerling or egg production facility. For the purposes of these requirements, fingerlings are defined as trout weighing less than 10 grams.



## SECTION 8: ADDITIONAL REQUIREMENTS FOR SMOLTS PRODUCED IN CAGE-CULTURE OPERATING IN FRESHWATER BODIES (E.G. LAKES, LOCHS, RESERVOIRS).

Section 8 applies to all cage-culture salmon smolt facilities seeking certification to the ASC Freshwater Trout Standard. These facilities can only be certified if they are operated in a region where indigenous salmonids are present of the same species being cultivated.

Cage-culture produced smolts supplied to an ASC Salmon Farm, must be accompanied with a copy of a valid ASC Freshwater Trout certificate.

INDICATOR	REQUIREMENT
8.1 The farm shall communicate each fish escape event to the local fishery trust(s).	Yes
8.2 The farm shall collaborate with fisheries trusts in wild salmonid monitoring programme(s) related to the waterbody it operates in.	Yes
8.3 The farm <sup>75</sup> shall conduct and make public, in collaboration with the local fishery trust(s), a scientific baseline study <sup>76</sup> to determine the genetic composition of the contemporary wild and farmed <sup>77</sup> salmonid population(s) within the waterbody it operates in.	Yes
8.4 The baseline study shall include known historical farmed and wild salmonid genetic profiles and determine if changes in the genetic composition of the contemporary wild salmonid population(s) have occurred. Where changes in the genetic profile of the wild salmonid population(s) are detected, the study seeks to determine if these	Yes

<sup>75</sup> A **collective study** with multiple/all salmonid smolt producers in the same water body is recommended under this Indicator.

<sup>76</sup> The study will use credible methodologies and analysis, and undergo peer review.

<sup>77</sup> Referring to the **genetic profile** of the fish farmed at the Unit of Certification.

have occurred through introgression of farmed salmon or through other mechanisms <sup>78</sup> (e.g. natural straining or stocking programmes).	
8.5 The baseline study will be updated every 3 years to determine if changes in the genetic composition of the wild salmonid population have occurred, and where detected, if changes are due to introgression of ASC-certified farmed smolts cultured within the same waterbody. This review shall be publicly available as well.	Yes
8.6 If following periods are applied, they must be timed to occur outside the local wild salmon(id) outmigration period.	Yes

**Rationale** – The production of cage-culture salmonid smolts creates potential impacts that extent beyond the impacts addressed through Principles 1 to 6. These potential impacts relate mainly to the consequences of escaped farmed smolts into areas with no native salmonids present as well as to the possible introgression of escaped farmed smolts with wild salmonid populations. Given the impact of escaped salmonids on ecosystems without indigenous salmonid populations present, ASC does not allow cage-culture of salmonid smolts in regions where no indigenous salmonids are present.

Furthermore, the intent of Indicators 8.1 – 8.6 is to require salmonid smolt producers to collaborate with local fisheries trusts in monitoring programmes and through scientific research aimed to establish a baseline study of the genetic profile of the local farmed and wild salmonid population(s). This study will reflect upon the genetic profile of the contemporary population(s) and if any historic introgression has occurred as a result of escaped farmed fish or through other mechanisms (natural straining or stocking programmes). Through periodic updates of the baseline study, it is intended to establish an actual insight into the success rate of escaped salmonid smolts breeding into the local wild salmonid population(s).

As a ISEAL-member, ASC is required to review and revise its standards every 3-5 years. The outcome of the 3-year review cycle of the baseline study will be considered in upcoming revisions of this section of the Standard.

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<sup>78</sup> **Changes of genetic composition** of wild (salmon) populations can also occur as a result of natural gene flow between populations. It is therefore important to determine if genetic changes are the result of introgression of farmed salmon into the wild population or due to natural gene flow between wild populations.

## Appendix I: Assessment data needed to comply with the ASC Freshwater Trout Standard

The ASC Freshwater Trout Standard requires a farm to have certain environmental and social assessment data that will allow the farm to demonstrate compliance with specific requirements. Below is a summary of the documentation needed. In some instances, the assessment must include specific recommendations for mitigating impacts, as well as a timeframe for implementing those mitigation steps.

This information is required for new and existing farms. If an existing farm has only some of the required information from a previous study or regulatory filing, it will need to fill in the gaps of information that it does not have. Significant farm expansions (increasing the physical footprint by more than 30 per cent) would require revised assessment data.

A producer may be able to collect some of this information by himself/herself. Collaboration with local environmental organizations or other entities with relevant knowledge is strongly encouraged.

### Principle 2

Farmers must provide the following information:

an analysis of habitats and ecosystems at the farm site and surrounding the farm, with a specific focus on identifying the farm's impact on:

- protected areas
- existing species listed on the IUCN Red List of Threatened Species as vulnerable, near threatened, endangered or critically endangered and their relevant habitats
- natural wetlands

mitigation measures/restoration of functional wetlands in line with the requirements in Requirement 2.1.2, if wetlands were subject to conversion for inlet and outlet infrastructure

for new farms (built after publication of these requirements) that don't have a minimum 15-metre riparian buffer zone, a third-party scientific analysis that demonstrates the farm's structures do not impede animal habitats and corridors, and do not present erosion risks

(if needed) an analysis of why any exceptional lethal actions against predators would not negatively affect wild populations or ecosystems, as well as specific limits on such actions

### Principle 3

For cage farms, see requirements under Appendix II-E. For land-based farms, see the faunal survey requirements in Appendix II-C.

## Appendix II: Methodologies related to Principle 3 - Water resources

### Appendix II-A: Methodology - total phosphorus discharged per tonne of production

This requirement looks at how much phosphorus (P) is discharged from the farm per unit of fish produced. The requirement is set at 5 kg/tonne for the first three years after publication of the ASC Freshwater Trout Standard, dropping to 4 kg/tonne thereafter. Trout facilities must calculate their discharge using a “mass balance” approach that calculates the discharge from the phosphorus in the feed and the phosphorus in the fish biomass. Farms would be able to subtract P that is physically removed in sludge (documented sludge removal with P levels tested) where this is practiced.

To calculate P released into the environment, one must calculate P used to produce one unit of fish and subtract P taken up by the fish and P removed in sludge (if any). The basic formula per time period, to be calculated for the previous period of 12 months (counted from the first day of the previous month back) is:

**P released to the water body per unit of trout produced = (P in – P out)/biomass produced**

where:

- **P<sub>in</sub> = Total P in feed**
- **P<sub>out</sub> = (Total P in biomass produced) + (Total P in sludge removed)**

Where the following definitions of the parameters apply in the basic formula:

#### Equation #1: Total P in feed

- $\sum$ (Total amount of feed type (product) multiplied by content of phosphorus) 1.....X), where 1.....X represents the number of different feed types (products) used.
  - The phosphorus content per feed type can be determined either by chemical analyses of the feed type, or based on declaration by the feed producer of phosphorus content in the feed type in jurisdictions where national legislation order phosphorus content of feed to be declared.

#### Equation #2: Biomass produced

- Biomass of fish produced over a specific time period within a UoC is calculated as:
- $B_{\text{produced}} = B_{\text{out}} - B_{\text{in}}$ , where:
  - $B_{\text{in}} = (\sum B_{\text{standing stock UoC start time period}}) + (\sum B_{\text{added to UoC during time period}})$
  - $B_{\text{out}} = ((\sum B_{\text{harvest of UoC}}) + (\sum B_{\text{mortalities of UoC}}) + (\sum B_{\text{escapes* of UoC}}) + (\sum B_{\text{standing stock UoC end of time period}}))$

In case  $\sum B_{\text{mortalities}}$  and/or  $\sum B_{\text{escapes}}$  are not known, client shall use value "0". Auditors can cross-check  $B_{\text{mortalities}}$  and  $B_{\text{escapes}}$  with evidence used to verify indicator 2.5.4-2.5.6 and 4.1.5

### **Equation #3: P content in biomass produced**

- P content in biomass produced = (Biomass produced)\*(% of P in fish)
  - For purposes of calculating this requirement, the following phosphorus percentages will be used for harvested fish or mortalities:
    1. Less than 1 kg: 0.43%
    2. More than 1 kg: 0.4%

### **Equation #4: Total P in removed sludge**

- P content in sludge removed = (sludge removed) \* (% of P in sludge)
  - Phosphorus in sludge removed per unit shall be determined based on analytical values that are representative of the batch of sludge removed from the farm.
  - The trout farm must demonstrate the sludge was physically removed from the farm site and that the sludge was disposed of according to indicator 3.2.4

## Appendix II-B: Water quality sampling methodology and data sharing for land-based systems

Requirement 3.2.2 requires land-based farms (flow-through and recirculation systems) to measure dissolved oxygen in the effluent. Requirement 3.2.5 requires these farms to submit to ASC the results from the water quality monitoring they conduct to comply with their local regulatory requirements. In particular, the requirement requires data on any sampling of phosphorus, nitrogen, TSS and BOD. This data will help to distinguish the performance of farms certified by this requirement over time, and assist in revisions to the requirement.

Oxygen saturation must be measured at least monthly in the early morning and late afternoon. A single oxygen reading below 60 per cent would require daily continuous monitoring with an electronic probe and recorder for at least a week demonstrating a minimum 60 per cent saturation at all times.

Farms shall use the following table to submit the results of effluent monitoring to ASC. Please list each analysis separately over the previous 12-month period.

Date	Analysis (TP, TN, BOD, TSS, etc.)	Location (Effluent, Inlet, etc.)	Method (Single grab, 24-hour bulk, etc.)	Sampling by Third Party? (Yes/No)	Analysis by Third Party? (Yes/No)	Result (including units)

## Appendix II-C: Sampling methodology for benthic macro invertebrate surveys

To comply with requirement 3.2.3, land-based farms must conduct sampling of the benthic macro invertebrate habitats in the receiving body of water downstream and upstream of the effluent discharge point. The requirement requires that the downstream benthic status be similar or better than the upstream benthic status. To demonstrate this, the survey must demonstrate that the downstream location has the same or better benthic health classification as the upstream location.

Below are required components of the sampling methodology and classification scheme that a farm must use. It is expected that a farm will use the faunal sampling regime in its own jurisdiction, as long as the regime includes the following minimum requirements.

This appendix also includes additional suggested ideas on conducting the surveys. The suggestions are intended as a guide only. The consultant conducting the faunal survey should use his/her discretion based on local knowledge, national fauna index systems, and expertise as to what specific sub-element or parameter will provide the best representation to document the status of the benthic macro invertebrates and the impact that the fish farm may have on this environment in the receiving water body.

### **Minimum requirements for faunal surveys:**

#### Classification system

The benthic health classification system must have at least five categories of benthic status.

#### Focus of the survey

The survey must detect the composition, abundance, diversity and presence of benthic invertebrate fauna in the receiving water body (upstream and downstream from farm outlet). The survey must focus on key sensitive indicator species.

#### When and how often

The samples must be collected once every year upstream and downstream from the farm outlet. In case the downstream survey drops a category according to the faunal index, two consecutive faunal surveys must be conducted during the following 12 months, using the same faunal index system, that demonstrate compliance with the requirement.

After three years of demonstrating consistent results, a farm may reduce sampling to once every two years.

#### Where to sample

The samples must be taken from both midstream and near the bank and must also include marginal areas with slacker water flow.

All efforts must be made to isolate the impact of the farm, for example by seeking similar conditions, such as type of bottom, water flow and/or substrate types present along the bank, in the upstream and downstream locations.

The location of sampling sites downstream from the farm must reflect a scientific assessment of the most likely area of potential impact from the farm, with consideration to the mixing of water and the minimum and maximum distance from the farm outlet.

#### Number of samples

The survey must collect samples in at least three transects (10 metres apart), with at least four samples in each transect across the river. This must be conducted both upstream and downstream from the farm outlet.

#### Analysis of the samples and how to sample

All collected samples must be analysed by an accredited laboratory and the sampling methodology must be approved by the laboratory conducting the analysis.

### **Further recommendations to sampling**

#### When and how

When collecting macro-invertebrates, consideration should be given to the seasonality of the presence of the macro-invertebrate species, namely insects in their larval stage of the life cycle. It is generally recommended that samples are conducted during summer and/or winter. In geographical regions like Scandinavia, spring and autumn are recommended as the best times for sampling.

#### Where to sample

Survey results may depend on the type of water body, type of marginal areas, sample method and sampling practice. More standardized data collection are typically needed to assess the relative merits of sampling in midstream or marginal areas although practical considerations (e.g. strong currents), particularly in wide, deep rivers, will favour the use of marginal samples in areas where the water flow is slacker. If samples are only collected near the bank and/or in the marginal areas, it is recommended to sample all available substrate types present along the bank.

#### Sampling gear

The sampling should be undertaken using standard equipment such as surber sampler, handnet and grab. More detailed sampling guidelines can also be found in the following ISO standards: ISO 8265, 7828 and 9391.

### **References**

Common Implementation Strategy for the Water Framework Directive (2000/60/EC) Guidance document no. 7. Monitoring under the Water Framework Directive.

Biological assessment of running waters in Denmark: introduction to the Danish Stream Fauna Index (DSFI) Skriver et al., 2000.

The performance of a new biological water quality score system based on macroinvertebrates over a wide range of unpolluted running-water sites. Amitage P.D et al., 1982.



Common Implementation Strategy for the Water Framework Directive (2000/60/EC) Guidance document no. 13. Overall approach to the classification of ecological status and ecological potential.

UN/ECE Task Force on Monitoring & Assessment under the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki, 1992) Volume 3: Biological Assessment Methods for Watercourses.

## Appendix II-D: Sludge BMPs for land-based systems (RAS/recirculation and flow-through)

Methods to mitigate the impacts from fish metabolic wastes on water can range from the employment of simple settling ponds to the use of advanced technology filters and biological process. Dealing responsibly with the waste (sludge, liquid slurry, biosolids) from these processes is a critical element to responsible trout farm management. The ASC Freshwater Trout Standard acknowledges that BMPs related to other principles such as correct feed composition and texture as well as good feed management practices—such as not storing feed for too long—can also influence the effectiveness of biosolids capture; however, this section deals with practices for cleaning, storage and disposal that will minimise the potential impacts of sludge/biosolids being released into the environment.

All land-based systems shall employ/undertake the following in relation to sludge/biosolids:

- A process flow drawing that tracks/maps the water and waste flow of a farm, including treatment of waste, transfer of wastes, waste storage and final waste utilisation options. Flow diagram should indicate the farm is dealing with biosolids responsibly. (Auditing guidance for evaluating whether the plan indicates responsible use: The system design shall allow for simple cleaning routines of pipes, sumps, channels and units.)
- Farm shall have a management plan for sludge/biosolids that details cleaning and maintenance procedures of the water treatment system. The plan must also identify and address the farm's specific risks such as—but not limited to—loss of power, fire and drought. The management can be evaluated in relation to maintenance records.
- Farm must keep detailed records/log of sludge/biosolid cleaning and maintenance including how sludge is discarded after being dug out of settlement ponds.
- Biosolids accumulated in settling basins shall not be discharged into natural water bodies.

## Appendix II-E: Assimilative capacity assessment—cage systems

All cage farms in lake or reservoir settings with a surface area of less than 1,000 km<sup>2</sup> must demonstrate that an assimilative capacity assessment has been conducted to determine if there is sufficient capacity from a water quality perspective to allow for the level of proposed additional loading to the system. The assessment is also required for operations in these water bodies proposing an increase in production of 30 per cent or more.

Many suitable models exist that can help determine assimilative capacity, such as Dillon and Rigler (1975), Kirchener and Dillon (1975), Reckhow (1977) and Dillon and Molot (1996). The ASC Freshwater Trout Standard SC will not favour one existing model over another but considers it important to outline key elements of a credible assimilative capacity study.

At a minimum, the study must do the following:

- Undertake assessment as to allocation of capacity for the whole water body
- Undertake assessment as to land use, slope, sewage, other discharges, stream input
- Account for retention in lake and mixing
- Predict total phosphorus concentration
- Classify trophic status
- Undertake impact assessment of fish farm

The study must pay particular attention to the nature and morphology of the lake basin where the farm will be established. The study must analyse at a minimum:

- mixing of the surface and bottom waters
- whether bottom waters are isolated within the water body
- the naturally occurring oxygen levels in the surface and bottom waters
- whether the water forms part of an enclosed basin, or an area with isolated bottom waters

## Appendix II-F: Classification of cage sites

For cages located on water bodies with a surface area of 1,000 km<sup>2</sup> or greater, the assimilative capacity study described in Appendix II-C is not required because of the difficulty of conducting such studies on massive water bodies and linking them to the appropriate production levels of an individual farm. Instead, farms must demonstrate they are located at sites that are least sensitive to nutrient discharges because they are exposed to more energetic conditions, have a connection to deep offshore waters and don't have hydrodynamically isolated embayments.

To determine if a farm is in such an appropriate location, these requirements reference the classifications developed by the Ontario Ministry of Environment (Boyd et al 2001):

**Type 1:** enclosed (lake-like) basins with limited flushing;

**Type 2:** partially exposed sites having good epilimnion/metalimnion flushing but limited or no hypolimnion exchange; and

**Type 3:** exposed locations where the hypolimnion is also well flushed.

(Definitions: The epilimnion is the top-most layer in a thermally stratified lake; the metalimnion is the middle layer in a thermally stratified lake or reservoir; the hypolimnion is the dense, bottom layer of water in a thermally stratified lake.)

Farms must be located in a Type 3 site. If the farm's local regulator uses the above classification system and has already classified the site, the regulator's classification will be used. If such a system is not in place, an independent consultant (not an employee of the trout producer or any related companies) must certify that the farm's location is consistent with the definition of Type 3 as described in Boyd et al., 2001, and provide a detailed analysis to support that determination.

## Appendix II-G: Receiving water monitoring for cage-based systems

### Sampling Regime for Receiving Water Quality Monitoring

Location of sampling stations: Stations will be established at the limit of the cage farm management zone on each side of the farm, roughly 50 metres from the edge of the cages and at reference stations located approximately 1-2 kilometres (km) up current and down current. All sampling locations will be identified with GPS coordinates on a schematic outline of the farm operations and on available satellite imagery.

Sampling methods: All water samples testing for total phosphorus shall be taken from a representative composite sample through the water column to a depth of the bottom of the cages. Samples will be submitted to an accredited laboratory for analysis of TP to a method detection limit of < 0.002 mg/L. Dissolved oxygen measurements will be taken at 50 centimetres from the bottom sediment.

**Frequency:** Samples will be taken at least once every three months during periods without ice.

**\*\*NOTE:** Some flexibility on the exact location and method of sampling is allowed to avoid farms needing to duplicate similar sampling for their local regulatory regime.

	Boundary Stations (note that if the farm is attached to land via a walkway, only three stations would be used)			Reference Stations		
	North	South	East	West	Upcurrent	Downcurrent
TP (mg/L)	X	X	X	X	X	X
DO profile (mg/L)	X	X	X	X	X	X

## Appendix II-H: Trophic status classification and determining baseline trophic status

Requirement 3.3.6 requires a farm to determine a baseline trophic status for the water body and demonstrate through monitoring that the status is maintained. The ASC Freshwater Trout Standard uses a modified version of the trophic status system developed by the Organization for Economic Cooperation Development (OECD) (Vollenweider and Kerekes, 1982). Trophic status is determined by the concentration of total phosphorus.

Trophic Status	Range of Total Phosphorus Concentration ( $\mu\text{g/l}$ )
Ultra-oligotrophic	< 4
Oligotrophic	4-10
Mesotrophic	10-20
Meso-eutrophic	20-35
Eutrophic	35-100
Hyper-eutrophic	> 100

(Note: these ranges are identical to ones described in an Environment Canada report titled “Canadian Guidance Framework for the Management of Phosphorus in Freshwater Systems, Science-based Solutions Report 1-8, February 2004.”)

### Determining baseline

See Audit Manual.

## Appendix III: Feed resource calculations and methodologies

### 1. Forage Fish Dependency Ratio calculation

Feed Fish Dependency Ratio (FFDR) is the quantity of wild fish used per quantity of cultured fish produced. This measure can be weighted for fishmeal or fish oil, whichever component creates a larger burden of wild fish in feed. In the case of trout at current status, the fish oil usually will be the determining factor for the FFDR. The dependency on wild forage fish resources should be calculated for fishmeal and fish oil using the formulas provided below. In this requirement, it is the highest number (i.e., dependency) that is relevant and must be used. This formula calculates the dependency of a single site on wild forage fish resources, independent of any other farm.

NOTE: THESE REQUIREMENTS ARE ONLY CALCULATED ON FISH WEIGHING 30 GRAMMES OR MORE.

$$\text{FFDR}_{\text{fishmeal}} = \frac{(\% \text{ fishmeal in feed from forage fisheries}) \times (\text{eFCR})}{22.2}$$

$$\text{FFDR}_{\text{fish oil}} = \frac{(\% \text{ fish oil in feed from forage fisheries}) \times (\text{eFCR})}{5.0}$$

Notes:

Economic Feed Conversion Ratio (eFCR) is the quantity of feed used to produce the quantity of fish harvested.

The percentage of fishmeal and fish oil excludes fishmeal and fish oil derived from fisheries by-products<sup>79</sup>. Only fishmeal and fish oil that is derived directly from a pelagic fishery (e.g. anchoveta) is to be included in the calculation of FFDR. Fishmeal and fish oil derived from fisheries by-products (e.g. trimmings and offal) should not be included because the FFDR is intended to be a calculation of direct dependency on wild fisheries.

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<sup>79</sup> **Trimmings** are defined as by-products when fish are processed for human consumption or if whole fish is rejected for human consumption because the quality at the time of landing does not meet official regulations with regard to fish suitable for human consumption. Fishmeal and fish oil that are produced from trimmings can be excluded from the calculation as long as the origin of the trimmings is not from any species that are classified as critically endangered, endangered or vulnerable on the IUCN Red List of Threatened Species (<http://www.iucnredlist.org/>).

The amount of fishmeal in the diet is calculated back to live fish weight by using a yield of 22.2 per cent. This is an assumed average yield. If a different yield is used, documentation must be provided.

The amount of fish oil in the diet is calculated back to live fish weight by using a yield of 5 per cent. This is an assumed average yield.

## 2. Calculation of EPA and DHA in feed

In order to demonstrate compliance with the requirement related to the maximum amount of EPA and DHA from direct forage fisheries in the feed, the calculations shall be done according to the following formula:

Grams of EPA and DHA in feed = (grammes of fish oil per kg feed)\* (% of EPA and DHA in fish oil)/100  
where:

If the fish oil content varies in different feeds used during the production cycle, a weighted average can be used. The grammes of fish oil relate to fish oil originating from forage fisheries for industrial purposes.

The content of EPA and DHA of the fish oil shall be calculated using these average figures:

- Fish oil originating from Peru and Chile and Gulf of Mexico: 30 per cent EPA and DHA in fish oil (also known as Group a)
- Fish oil originating from the North Atlantic (Denmark, Norway, Iceland and the UK): 20 per cent EPA and DHA in fish oil (also known as Group b)
- If fish oil is used from areas other than mentioned above, they should be classified as belonging to Group a if analyses of EPA and DHA is above 25 per cent, and into Group b if analyses of EPA and DHA is below 25 per cent

Analyses of EPA and DHA are the percentage of fatty acids in the oil that are EPA and DHA. In the calculation above, we make the simplification that 100 per cent of the oil consists of fatty acids. EPA and DHA originating from fish oil originating from by-products and trimmings are not included in the calculation above. The feed producer can justify and demonstrate the amount of fish oil coming from trimmings and by-products by using a percentage of fish oil originating from trimmings based on information from purchases in an annual year, either using information related to the current year when the feed is produced or the previous year.



## Appendix IV – Containment Plan

Farms must develop and implement a Containment Plan (CP) with the focus to minimise the risk of fish escape events. Escaped fish could pose a risk for the biodiversity of the newly inhabited water body, as well as posing a possible risk for genetic introgression with native specimens of the same species and/or genus, leading to genetic drift over time.

Besides the possible environmental consequences of escaped fish, it also forms an economic loss for the farm(er).

The Containment Plan must be tailored to site-specific conditions and at least cover the following aspects:

1. Site-selection:
  - Cage-culture<sup>80</sup> e.g.
    - Hydrological characteristics: wind-induced waves, natural/tidal currents, intermittent currents (e.g. discharge from hydroelectric reservoirs), river flow characteristics
    - Assessment of bottoms of freshwater water bodies.
  - Land based systems (raceway, ponds, RAS), e.g.
    - Soil compactness and permeability,
    - Susceptibility to flooding of nearby streams/rivers/lakes based on 25 years events
2. Infrastructural measures (installation and choice of materials):
  - Cage-culture<sup>80</sup> e.g.
    - Mooring systems (including anchors, shackles, connectors, chains, ropes and buoys) are designed in respect of all envisaged environmental conditions during all conceivable operations
    - Each farm location should be boomed on the side of prevailing current to prevent any waterborne debris or foreign bodies from damaging nets
    - Depending on the site, suitable material for cages is chosen (steel, plastic, wood) in respect of all envisaged environmental conditions during all conceivable operations
    - Quality of nets and ropes are chosen in respect of all envisaged environmental conditions during all conceivable operations.
    - Net mesh must be sized to a maximum of at least 50% weight of stock size
    - Use a minimum stocking weight of 15g to eliminate “leakage” escapes
  - Land based systems (raceway, ponds, RAS), e.g.
    - Fish holding units are constructed using materials suitable in respect of all envisaged environmental conditions during all conceivable operations

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<sup>80</sup> All salmon smolt producers in freshwater Lochs in Scotland should conform to the recommendations of the Technical standard for Scottish Finfish Aquaculture: <http://www.gov.scot/Resource/0047/00479005.pdf>

- Fish holding units are arranged or protective measures employed to prevent damage by vehicles
- Effective screens or barriers of appropriate mesh size for the smallest trout present to be sized to a maximum of at least 50% weight of stock size. Next to primary screens to prevent fish entering the filtration system, secondary screens are recommended before site discharge.

3. Operational measures:

- Keeping records of for all movement of fish on the farm, number of fish being kept on the farm, known escapes and unexplained loss of fish

For cage-culture systems<sup>80</sup>: Presence of a protocol for regular net inspections that includes:

- Daily visual inspections (weather and safety conditions permitting);
- Weekly inspection of the top section of nets;
- Full inspection (lifted out of the water) prior to any procedure such as crowding of fish or grading;
- Annual testing, in accordance with a detailed test procedure based on manufacturer's advice and using a documented quality control system;
- Inspections and maintenance in situations where fish are reported to have escaped, or after specific incidents such as vandalism, predator attack or exceptional weather conditions;
- Any husbandry procedures involving handling should be undertaken with a secondary catch net at all times to minimise any risk of escapes;
- Before any pen movements the planned route must be checked by site personnel. A secondary net could be inserted ahead of fish pen to prevent any damage to cage nets. The movement route must be signed and checked by farm manager.

For land-based systems: Presence of a protocol for regular net inspections that includes:

- Daily visual inspection aimed to detect any unreported loss of fish due to escapes and possible failure of escape screens or barriers;
- Inspection and maintenance in situations where fish are reported to have escaped, or after specific incidents such as vandalism, predator attack or exceptional weather conditions.
- Any husbandry procedures involving handling of fish in the vicinity of escape-prone areas (e.g. inflow and outflow/effluent canals) should be undertaken with a secondary catch net at all times to minimise any risk of escapes.