

# **FRESHWATER TROUT AQUACULTURE DIALOGUE**

**Draft standards for environmentally and socially  
responsible trout farming**

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These draft standards are released for public comment by the Steering Committee of the Freshwater Trout Aquaculture Dialogue. The Steering Committee is composed of a representative from each of the following organizations:

BioMar

BlueYou Consultancy

British Trout Association

(representing the Federation of European Aquaculture Producers)

FishWise

Liman

North Sea Foundation

Università dell'Insubria

World Wildlife Fund

This document contains draft standards for environmentally and socially responsible freshwater trout farming. The standards do not represent final agreement by the Freshwater Trout Aquaculture Dialogue Steering Committee. The document is presented as a working draft that will benefit from public input. The standards are open for public comment from July 27, 2010 through September 27, 2010. Comments can be submitted via the website at [www.worldwildlife.org/troutdialogue](http://www.worldwildlife.org/troutdialogue). Feedback received during the public comment period will be posted online and used to develop revised draft standards. The Steering Committee expects to continue debating outstanding issues and developing alternatives based on public input, proactive outreach, and further research during the next several months. The Steering Committee will hold a Dialogue meeting in September 2010, prior to releasing a second draft of the standards and opening a second public comment period.

**Table of contents:**

INTRODUCTION..... 4

PRINCIPLE 1: COMPLY WITH ALL NATIONAL AND LOCAL LAWS AND REGULATIONS..... 10

PRINCIPLE 2: CONSERVE HABITAT AND BIODIVERSITY ..... 12

PRINCIPLE 3: MINIMIZE NEGATIVE EFFECT ON WATER RESOURCES..... 21

PRINCIPLE 4: PROACTIVELY MAINTAIN THE HEALTH AND WELFARE OF CULTURED FISH AND MINIMIZE THE RISK OF DISEASE TRANSMISSION ..... 26

PRINCIPLE 5: USE RESOURCES IN AN ENVIRONMENTALLY EFFICIENT AND RESPONSIBLE MANNER..... 29

PRINCIPLE 6: BE SOCIALLY RESPONSIBLE ..... 39

Appendix I: Assessment of data needed to comply with FTAD standards ..... 49

Appendix II: Methodologies related to Principle 3 – Water Resources ..... 51

Appendix III: Biosecurity plan..... 58

Appendix IV: Veterinary health plan ..... 58

Appendix V: Feed resource calculations and methodologies ..... 60

## INTRODUCTION

Seafood is one of the most popular sources of protein worldwide. By volume, approximately half of the seafood we eat is wild caught. But the other half is from aquaculture—the fastest growing food production system in the world—and aquaculture’s contribution is expected to continue to rise.

As with many rapidly growing industries, the growth in aquaculture production has raised concerns about negative social and environmental impacts related to farming, such as water pollution, the spread of diseases and unfair labor practices at farms. Although some producers are addressing these issues well, others are not doing so at all or are doing so poorly.

One tool to help encourage more responsible aquaculture is global standards – numbers or performance levels that must be reached to help minimize or reduce a set of impacts. Standards can be used to benchmark other standards, incorporated into existing certification programs, adopted for government programs, and be the foundation for buyer and investment screens. They also can be the basis for an independent, auditable certification program.

The Freshwater Trout Aquaculture Dialogue (FTAD) roundtable is creating global performance-based standards for freshwater trout farming, one of the earliest forms of aquaculture in the world. Most of the freshwater trout consumed today is farmed. Each standard developed by the FTAD will be based on an impact, principle, criteria and indicator, as defined below:

- Impact: The problem to be addressed
- Principle: The high-level goal for addressing the impact
- Criteria: The area to focus on to address the impact
- Indicator: What to measure in order to determine the extent of the impact

When finalized, the FTAD standards will be given to a new organization (the Aquaculture Stewardship Council) that will be responsible for working with independent, third party entities to certify farms that are in compliance with the standards.

Created in 2008 by World Wildlife Fund (WWF), the FTAD includes more than 200 producers, environmental and social non-governmental organizations (NGOs), development organizations, retailers, wholesalers, aquaculture associations, academics, researchers, government representatives and independent consultants. The FTAD’s eight-person Steering Committee (SC) is responsible for managing the FTAD process and making all final decisions related to the freshwater trout standards document. This group of volunteers includes representatives from freshwater trout producer groups, feed manufacturers, environmental NGOs, consulting firms and academia.

The FTAD process and draft standards are described in this document. Auditor checklists and guidance documents, which will be developed after the freshwater trout standards are finalized, will explain the methods to be used by auditors to determine if the standards are being met. A Better Management Practices (BMP) manual for freshwater trout aquaculture also will be created. The manual, geared toward producers, will explain specific steps that can be taken to meet the standards. The BMP manual

will be particularly useful to those producers who do not have the capability to test new and innovative techniques that could be used to meet or exceed the standards.

The draft standards document will be posted for two public comment periods before being finalized. The first comment period will be from July 27, 2010 through September 27, 2010. All input received during the comment periods will be used by the SC to revise the standards document. The SC also welcomes feedback at the FTAD meeting that will be held in Verona, Italy September 7-8, 2010.

This document does not reflect final agreement by the FTAD SC. The draft standards outlined below are a tentative set of ideas put forward for public discussion. The SC will continue to debate outstanding issues and develop alternatives based on public input, proactive outreach and further research.



This flag icon is used throughout the document to indicate a specific issue about which public feedback would be particularly helpful to the SC in formulating an effective standard. Public comment is, however, encouraged on any part of the document.

For complete information about the FTAD, including meeting summaries and presentations, go to [www.worldwildlife.org/troutdialogue](http://www.worldwildlife.org/troutdialogue)

## **PURPOSE AND SCOPE OF THE FRESHWATER TROUT AQUACULTURE DIALOGUE STANDARDS**

### **Purpose of the Standards**

The purpose of the FTAD standards is to provide a means to measurably reduce or eliminate the negative impact freshwater trout farming can have on the environment and society (i.e., farm workers and people who live in communities near freshwater trout farms). The standards are designed to describe best performance today on environmental and social issues. The standards must meet the dual goal of being environmentally and socially rigorous, while attracting sufficient producer interest to create noticeable change over time.

Food safety, sentient fish welfare and the nutritional value of farmed trout are not addressed directly in the standards. However, they are dealt with indirectly through fish health, water quality, feed composition and other standards.

### **Scope of the Standards**

#### ***Range of activities within aquaculture to which the standards apply***

Aquaculture is the production of aquatic organisms. It involves the planning, development and operation of facilities, which in turn affect the inputs, production, processing and chain of custody components.

The FTAD standards apply to the planning, development and operation of freshwater trout aquaculture production systems. Planning includes farm siting; resource use or extraction; and assessment of environmental, social and cumulative impacts. Development includes construction, habitat alteration

and access to public areas by other resource users. Operation includes effluent discharge, working conditions, use of antibiotics and other chemicals, as well as feed composition and use.

#### ***Geographic scope to which the standards apply***

The freshwater trout standards apply to all locations and scales of freshwater trout farm-based aquaculture production systems in the world.

#### ***Systems to which the standards apply***

The standards are technology-neutral and, therefore, apply to all types of production systems, such as flow-through systems, re-circulating systems and cages in lakes. The standards seek to set equivalent environmental performance regardless of the production systems. Production systems that typically have greater environmental or social impacts will have more difficulty complying with the standards.

#### ***Unit of certification to which the standards apply***

The unit of certification for the FTAD standards is the farming operation. The size of the production operation can vary considerably. Given that the focus of the freshwater trout standards is on production and the immediate inputs to production, the unit of certification will typically consist of a single farm or some other type of collective grouping.

The unit of certification could be a group or cluster of facilities or operations that should, for a number of reasons, be considered collectively as the aquaculture operation under consideration. For example, they may share resources or infrastructure (e.g., water sources or an effluent discharge system), share a landscape unit (e.g., a watershed), have the same production system, and/or involve the same species and have a common market outlet. This group or cluster must be a legal entity that shares a common management structure so that the freshwater trout standards are binding for each individual producer. Regardless of the specific situation, farms and other users often can have cumulative effects on the environment and society. As a result, some of the FTAD standards are independent of what a producer can achieve at the farm level. Also, some FTAD standards rely on the efforts of the producer to act as an advocate and steward of their environment.

Each farm will be evaluated based on its activity. For example, if the farm operates a hatchery on site, the hatchery will need to comply with the standards. If the farm does not operate a hatchery, the farm will be held accountable only for the operations on site. Some indicators require the farm to demonstrate that key production inputs, such as feed and the origin of juvenile fish, are traceable and meet minimum standards.

## **PROCESS FOR CREATING THE STANDARDS**

### **General Considerations**

The process of setting standards is critical, as it largely determines the credibility, viability, practicality and acceptance of the standards. The process of creating the FTAD standards has been – and will continue to be – multi-stakeholder, open and transparent. This is in line with the International Social and Environmental Accreditation and Labeling (ISEAL) Alliance’s “Code of Good Practice for Setting Social and Environmental Standards.” A goal of the FTAD is to follow the ISEAL code.

### Process for Creating the Freshwater Trout Aquaculture Dialogue Standards

- In 2007, WWF notified ISEAL of the intent to apply the “Code of Good Practice for Setting Social and Environmental Standards” to the FTAD. ISEAL accepted WWF as an associate member on behalf of all of the Aquaculture Dialogues.
- In July 2008, under the leadership of WWF, the FTAD was created and Christoph Mathiesen of WWF was hired to coordinate the FTAD.
- At the inaugural FTAD meeting, held in Denmark in November 2008, participants approved the [goals and objectives for the FTAD](#), identified the key environmental and social impacts associated with the farming of freshwater trout and drafted principles for addressing each impact. They also began to create the SC, which now includes the following people:

| Name                   | Organization   | Sector                 | Country        |
|------------------------|--|------------------------|----------------|
| David Bassett          | British Trout Association, representing the Federation of European Aquaculture Producers | Producers              | United Kingdom |
| Merrielle Macleod      | World Wildlife Fund  | Environmental NGO      | United States  |
| Sian Morgan            | FishWise   | Environmental NGO      | United States  |
| Niels Alsted           | BioMar   | Feed manufacturer      | Denmark        |
| Yavuz Papila           | Liman  | Producer               | Turkey         |
| Marco Saroglia         | Università dell'Insubria   | Academia               | Italy          |
| Rene Benguerel         | BlueYou Consultancy  | Aquaculture consultant | Switzerland    |
| Margreet van Vilsteren | North Sea Foundation   | Environmental NGO      | Netherlands    |

The FTAD has also benefitted from the inputs of former SC members Dawn Purchase of the Marine Conservation Society and Luz Arrequi of Tres Mares.

- At the second FTAD meeting, held in the Faroe Islands in May 2009, participants developed draft criteria.

- In June 2009, the SC finalized the [FTAD process document](#), developed a roadmap for completing the FTAD standards and created the initial outreach strategy for the FTAD.
- In November 2009, at an FTAD meeting in Spain, participants began to develop draft indicators.
- The FTAD’s SC held two multi-day in-person meetings and numerous conference calls between January and July 2010 to create draft standards and to refine the FTAD roadmap for completing the standards-development process.
- From April 2009 to March 2010 the FTAD coordinator and SC members held outreach meetings (in person, or via phone or e-mail) with stakeholder groups identified in the FTAD’s outreach strategy. Additional outreach meetings will be held with key stakeholders during the two comment periods. Outreach to date includes:

| <b>Date</b>  | <b>Location</b> | <b>Target Audience</b>  |
|--------------|-----------------|---|
| April 2009   | Denmark         | Producers, government aquaculture researchers, feed producers and consultants |
| June 2009    | Spain           | Producers, government researchers, consultants and environmental/social NGO’s |
| October 2009 | Poland          | Producers, government and aquaculture researchers                             |
| October 2009 | Italy           | Producers, government and feed producers                                      |
| March 2010   | Turkey          | Producers, government officials and environmental/social NGOs                 |

- Draft principles, criteria, indicators and standards were posted for the first of two public comment periods on July 27, 2010. The comment period will end on September 27, 2010. The second comment period is expected to begin during the fourth quarter of 2010. Feedback received during both comment periods will be used by the SC to revise and finalize the standards document. All general and specific comments received, as well as a summary of key themes in the feedback and the SC’s responses to those themes, will be posted on the FTAD website.
- Final standards will be given to a new entity, the ASC, which will be responsible for working with independent, third party entities to certify farms that are in compliance with the standards for responsible aquaculture being created by participants of the Aquaculture Dialogues. The ASC is expected to be in operation in 2011.
- Throughout the process, WWF has written and disseminated press releases, and developed/updated the FTAD website, to keep people informed of upcoming meetings and progress within the FTAD.



### **Continuous Improvement of the Freshwater Trout Aquaculture Dialogue Standards**

As stated in the ISEAL “Code of Good Practices for Setting Social and Environmental Standards,” “. . . standards shall be reviewed on a periodic basis for continued relevance and effectiveness in meeting their stated objectives and, if necessary, revised in a timely manner.” It is implicit in the development of the FTAD standards that the performance levels will be adjusted over time to reflect new data, improved practices and new technology that permits a further reduction in impacts. The FTAD is assuming that the standards will be revised approximately every three years.

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

*Impacts: Principle 1 is intended to ensure that all farms aiming to be certified to the FTAD standards 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 Operate within the legal framework of national and local laws and regulations that are applicable and current

| INDICATOR  | STANDARD |
|--|----------|
| 1.1.1 Documents proving compliance with local and national authorities on land and water use (e.g., permits, evidence of lease, concessions and rights to land and/or water use) | Yes      |
| 1.1.2 Documents proving compliance with tax laws   | Yes      |
| 1.1.3 Documents proving compliance with all labor laws and regulations   | Yes      |
| 1.1.4 Documents proving compliance with water quality parameter requirements and measuring effluent and therapeutant / chemical levels   | Yes      |

#### Rationale

To assure trout farms are operating legitimately within their region and country, the FTAD standards require confirmation in these focused areas: use rights, tax laws, labor laws and water quality regulations. While proving 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 standards 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.

#### Additional information for review of first draft

- This principle is focused on national and local laws and regulations and does not include international laws and regulations. Many of the stakeholders in the FTAD process recognize the importance of international laws. However, the practicality of including international laws in

these global standards-- because of ratification and other issues-- means it is better to include references to these important international laws in other relevant sections of the document. Key environmental laws pertinent to the FTAD standards might include the International Labour Organization (ILO) laws and the Convention on Biodiversity (Ramsar), which are mentioned in principles 6 and 2, respectively.

- Despite concerns about equivalent status (e.g., ASC label) being granted to products grown in countries with varying levels of legal requirements, it is outside the scope of the FTAD to address differences in national legislation, providing that producers comply with the legislation. The remaining principles in this document set a common baseline to which all producers can comply.
- In the case of legal disputes that are under appeal—producers are innocent until proven guilty on the legal front due to the difficulties of no compendium of all legal laws from all countries.
- The FTAD SC considered requiring that industry associations in different countries compile lists of relevant legislation for farmers to use and for auditors to certify against. This would ensure that most or all relevant laws are accounted for in any given country. However, due to concerns regarding applicability of this across countries and regions, the above approach is suggested instead. Another approach considered was to require producers to list all legislation applicable to their farming operation in order to prove to auditors that they are aware of the requirements.

## PRINCIPLE 2: CONSERVE HABITAT AND BIODIVERSITY<sup>1</sup>

*Impacts: This principle encompasses biodiversity-related impacts related to 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 standards 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 standards 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.

This type of approach is of relevance to the trout farming sector, given that farms often are situated in areas of high environmental value and concern, where long-term coexistence between natural habitats and their vital components with human activities, such as trout farming, is important.

### 2.1 Siting and location of farms<sup>2</sup>

| INDICATOR  | STANDARD          |
|--|-------------------|
| 2.1.1. Allowance for siting in national Protected Areas. <sup>3</sup>  | None <sup>4</sup> |
| 2.1.2 If a farm is located within habitat for species listed on the International Union for Conservation of Nature (IUCN) “Red List of Threatened Species” as vulnerable, near threatened, | Yes               |

<sup>1</sup> Biodiversity (a.k.a. biological diversity) is the term given to the variety of life on earth and the natural patterns it forms. Biodiversity often is understood in terms of the wide variety between and within plants, animals, microorganisms and their associated genes. Another aspect of biodiversity is the variety of ecosystems where humans and other living creatures form a community, interacting with one another and with the air, water and soil around them. It is the combination of life forms and their interactions with each other that provides the foundation for the goods and services that sustain humans.

<sup>2</sup> To determine its compliance with the standards in 2.1, a producer will need documentation from a third party that analyzes 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 performed by a capable third party accredited by the relevant national authority or regulator.

<sup>3</sup> A Protected Area is “A clearly defined geographical space, recognized, 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>4</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/)

|   |   |
|---|---|
| endangered or critically endangered, the farmer must provide adequate habitat for such species on the farm or within 1 km of the farm |   |
| 2.1.3 Allowance for siting in natural wetlands <sup>5</sup> for new farms and expansion of existing farms (after publication of FTAD) | None, except where access to surface water is needed (e.g., canals for inlets and outlets). Converted area must be offset by restoration of 100% of the equivalent area of functional wetlands with the same habitat characteristics on the farm. |
| 2.1.4 Allowance for siting in natural wetlands for existing farms constructed after 1999  | All converted area must be offset by the restoration of 100% of the equivalent area of functional wetlands with the same habitat characteristics as on the farm or within 1 km of the farm  |
| 2.1.5 Allowance for siting in natural wetlands for existing farms constructed before 1999   | At least 50% of converted area must be restored as functional wetlands on the farm or by contributing funds to public aquatic ecosystem restoration within a 5 km radius of the farm  |

### Rationale

Trout farm siting can determine the farm’s impact on 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 major 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 to species within a political management unit. The lists use criteria that evaluate extinction risk. The FTAD focuses on the four categories that confer the greatest risk: near threatened, vulnerable, endangered and critically endangered.

Wetlands provide fundamental ecological services and are regulators of water regimes and sources of biodiversity at the species, genetic and ecosystem levels. 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. Progressive encroachment on, and loss of, wetlands causes serious and sometimes irreparable environmental damage to the provision of ecosystem services.

<sup>5</sup> **Wetland:** A wetland is an area of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters.


Wetlands should be restored and rehabilitated, whenever possible, and conserved by ensuring their wise use. Within the FTAD standards, 1999 is the benchmark for the definition and scope of “wetland conservation.” This is the year that the “Convention on Wetlands of International Importance” (a.k.a. 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.

To determine its compliance with these standards, a producer will need documentation from a third party that analyzes 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 performed by a capable third party accredited by the relevant national authority or regulator.

**Additional information for review of first draft**

The FTAD would like to see the concept of High Conservation Value Areas (HCVAs) included in a future revision of these standards in a few years. HCVAs are natural habitats where values are considered to be of outstanding significance or critical importance. The FTAD doesn’t believe it can incorporate HCVA methods into this version of the standards.

**2.2 Riparian buffer zones and restoration measures**

| INDICATOR   | STANDARD  |
|---|---|
| 2.2.1 For new farms and farm expansions, the mean minimum width of a riparian buffer zone <sup>6</sup> between and along the farming operation and adjacent water body  | TBD  |
| 2.2.2. For existing farms, documented evidence of an assessment <sup>7</sup> of the farm’s impact on the riparian buffer zone, and mitigation measures implemented to protect the ecological function of riparian buffer zones along the water body | Yes   |

**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. The FTAD requires that all new or expanding farms be constructed with a natural buffer zone between the farm and the natural watercourse adjacent to a trout farm. Existing farms need to have assessed their impact on riparian buffer zones and implemented

<sup>6</sup> A riparian buffer zone is the land immediately abutting the river or water body.

<sup>7</sup> Documentation can be based on an EIA or any other credible process of environmental assessment performed by a capable third party accredited by the relevant national authority or regulator.

mitigation measures as recommended by that assessment and within the recommended timeline.

To determine its compliance with these standards, a producer will need documentation from a third party that analyzes the farm’s impact on riparian zones and makes specific recommendations for mitigating impacts within a specific time frame. Documentation can be based on an EIA or any other credible process of environmental assessment performed by a capable third party accredited by the relevant national authority or regulator.

**Additional information for review of first draft**

Riparian buffer strips (where trout farms often are located) are an important means for conserving local biodiversity. However, defining the ideal riparian buffer strip is challenging (Fischer and Fischernitch, 2000<sup>8</sup>). Recommended widths for ecological concerns in buffer strips typically are much wider than those recommended for water quality concerns (Fischer et al. 1999; Fischer 2000<sup>9</sup>).

Lees and Peres (2008)<sup>10</sup> recommend buffer zones of > 400m (>200m on each side of the water course), but acknowledge that compliance with some countries’ legal requirements for even a 100 m buffer is currently minimal.

At the same time, most trout farms have difficulty establishing even modest buffer zones because of the nature of their licenses, which encourage proximity to a river, a desire to have a compact farm site or the natural geography of the location. In addition, farms may not own the riparian buffer land, or be able to exercise effective control of it, if the facility is located dozens of meters from the water’s edge.

🚩 In 2.2.1, the FTAD is considering the appropriate riparian buffer zone distance for new farms or expansions, balancing the concerns listed above.

**2.3 Introduction of exotic species<sup>11</sup>**

| INDICATOR | STANDARD |
|-----------|----------|
|-----------|----------|

<sup>8</sup> Fischer, R. A., and Fischenich, J.C. (2000). "Design recommendations for riparian corridors and vegetated buffer strips," EMRRP Technical Notes Collection (ERDC TN-EMRRP-SR-24), U.S. Army Engineer Research and Development Center, Vicksburg, MS. [www.wes.army.mil/el/emrrp](http://www.wes.army.mil/el/emrrp)

<sup>9</sup> Fischer, R. A., Martin, C. O., Barry, D. Q., Hoffman, K., Dickson, K. L., Zimmerman, E. G., and Elrod, D. A. (1999). "Corridors and vegetated buffer zones: A preliminary assessment and study design," Technical Report EL-99-3, U.S. Army Engineer Water ways Experiment Station, Vicksburg, MS., Fischer, R. A. (2000). "Widths of riparian zones for birds," EMRRP Technical Note Series, TN-EMRRP-SI-09, U.S. Army Engineer Research and Development Center, Vicksburg, MS.

<sup>10</sup> Lees, A.C., and Peres, C.A. (2008). Conservation value of remnant riparian forest Corridors of varying quality for Amazonian birds and mammals, *Conservation Biology*. 22, 439–449.

<sup>11</sup> The FTAD defines “exotic species” as non-native animals living in areas outside their native boundaries

2.3.1 Allowance for cultivation of non-indigenous trout species unless those species are already widely used<sup>12</sup> in commercial production locally by the date of the publication of the FTAD standards; and there is no evidence<sup>13</sup> of establishment<sup>14</sup> or impact on adjacent ecosystems; and the species have been approved for aquaculture use by a process based on International Council for the Exploration of the Seas (ICES)<sup>15</sup> code of practice on the introductions and transfer of marine organisms or comparable protocol

None

### Rationale

Accidental or intentional introductions of non-native species are significant global environmental problems.<sup>16</sup> Introduced species also can impact society and the economy, according to the United Nations Food and Agriculture Organization (FAO, 2005).

Aquaculture is considered to be one of the major pathways for introducing non-native aquatic plants and animals that may become harmful invasive species.<sup>17</sup> Rainbow trout, in particular, is one of the most widely introduced fish species in the world.<sup>18</sup> Therefore, the FTAD seeks to discourage the introduction of trout into waterways where these species are not native or previously established.

### Additional information for review of first draft

Rainbow trout, which is native to western North America, has been introduced to numerous countries for commercial aquaculture and recreational fishing. Reported impacts from introduction of Rainbow trout into habitats outside its natural range include genetic effects<sup>19</sup> on native trout populations, disease

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<sup>12</sup> Widely used: The species must be cultivated by at least a 50% share on total volume of production of the species group in the area / region / country or by more than 50% of the trout farms in the country

<sup>13</sup> Evidence: defined as peer review science published in the primary scientific literature that demonstrates environmental impacts

<sup>14</sup> The FTAD defines “established species” as introduced populations that are reproducing and sustaining in the wild without further introductions of any kind

<sup>15</sup> More information on the ICES “Code of Practice on the Introductions and Transfers of Marine Organisms” can be found on the ICES website: [www.ices.dk/reports/general/2004/icescop2004.pdf](http://www.ices.dk/reports/general/2004/icescop2004.pdf)

<sup>16</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.

<sup>17</sup> Invasive species: Organisms (usually transported by humans) which 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)). 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. Casal, C.M.V. 2006. Global documentation of fish introductions: the growing crisis and recommendations for action. *Biol. Invasions*, 8: 3–11.

<sup>18</sup> Global Invasive Species Database [www.issg.org](http://www.issg.org)

<sup>19</sup> In the United States, the introduction of Rainbow trout into areas outside of their native range has caused problems due to their ability to hybridise with native salmonid species, affecting their genetic integrity: (Lee et al. 1980 et seq.; Rinne and Minckley 1985; Page and Burr 1991), (McAfee 1966c; Moyle 1976b; Behnke 1992).



transmission, predation<sup>20</sup> and competition with native species.<sup>21</sup> In many countries, introduced Rainbow trout have been reported to have negative effects on native fish, amphibians and invertebrates.

The ICES “Code of Practice on the Introduction and Transfer of Marine Organisms” is one of the most comprehensive instruments to help in the responsible use of introduced species. The introduction of new, exotic and non-indigenous species must also be in compliance with national law, as specified in Principle 1.

## 2.4 Transgenic Trout

| INDICATOR  | STANDARD |
|--|----------|
| 2.4.1 Allowance for the culture of transgenic trout, including the offspring of genetically engineered trout | None     |

### Rationale

The culture of transgenic<sup>22</sup> trout is prohibited under the FTAD standards. The FTAD is concerned about the uncertainty surrounding the potential impacts of escaped transgenic trout breeding with the non-transgenic population, as well as the potential for transgenic trout to establish feral populations in the wild. Invoking the precautionary principle, the FTAD cannot allow for these species to be cultured until there is conclusive evidence that demonstrates that they pose an acceptable risk to adjacent ecosystems.

The culture of genetically enhanced<sup>23</sup> trout is acceptable under the FTAD. This allows for further progress in feed conversion, which should increase the efficient use of local resources. Also allowed under the FTAD standard is the cultivation of triploid and sex-reversed trout.

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(McAfee 1966a), (Muhlfeld et. al, 2009), (Behnke 1992), (Minckley 1973; U.S. Fish and Wildlife Service 1979b), (McAfee 1966c), (McAfee 1966c), (Blinn et al. 1993).

<sup>20</sup> Rainbow trout have the potential to consume native fish and compete with native salmonids (Page and Laird 1993). Introduced Rainbow trout eat endangered humpback chubs *Gila cypha* in the Little Colorado River, and may exert a major negative effect on the population there (Marsh and Douglas 1997). Fausch (1988), Clark and Rose (1997), and numerous papers cited in both, discussed several factors affecting competitive interactions between rainbow and brook trout. Rainbow trout drive nongame fishes, such as suckers and squawfish, from feeding territories (Li, personal communication to P. Moyle in Moyle 1976a). Introduced predatory fishes, including the Rainbow trout, are likely at least partially responsible for the decline of the Chiricahua leopard frog *Rana chiricahuensis* in southeastern Arizona (Rosen et al. 1995).

<sup>21</sup> In New Zealand it is suspected that rainbow trout affect native fish species through direct predation and competition for feeding areas (McDowall, 1990).

<sup>22</sup> Transgenic trout: A subset of genetically modified organisms, which are organisms that have inserted DNA that originated in a different species. Some GMOs contain no DNA from other species and, therefore, are not transgenic but cisgenic.

<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

## 2.5 Escapes from culture facilities

| INDICATOR  | STANDARD |
|--|----------|
| 2.5.1 Evidence of a well-designed and well-maintained culture system and infrastructure to prevent escapes during grow-out and at harvest, as demonstrated through the following:  |          |
| a.) Effective screens or barriers of appropriate mesh size for the smallest trout present  | Yes      |
| b.) Proper construction of pond banks or dykes that are of adequate height and construction to prevent breaching in exceptional flood events <sup>24</sup>   | Yes      |
| c.) Proper site selection, installation, choice of materials and maintenance of open net pens and cages to prevent escapes through damaged nets, specifically when there are exceptional weather conditions                                      | Yes      |
| d.) Accurate records on the number of fish being kept at one any time  | Yes      |
| e.) Installation and management of trapping devices to sample for the existence of escapes; data that is generated is recorded   | Yes      |
| f.) Traps on water outlets to catch escapes  | Yes      |
| g.) Escape recovery protocols  | Yes      |
| h.) Records on escapes, escape numbers and actions taken to prevent reoccurrence   | Yes      |
| 2.5.2 Presence of trout farming standard operating procedures (SOP) that incorporate an escape risk assessment. SOP must clearly define the correct procedures for each step of operation and identify the risk and supply mitigation procedures | Yes      |
| 2.5.3 Evidence of farm staff capacities and capabilities, including regular training of staff to understand and address risks from escapes and follow the defined SOPs   | Yes      |

### Rationale

<sup>24</sup> Exceptional flood events: Flooding that occurs as a result of a 100-year storm event.

The management practices in this criterion seek to minimize the risk of farmed fish escaping into the wild.

**Additional information for review of first draft**

The FTAD is considering whether to also develop a measurable indicator / standard for escapes by setting a maximum limit for an acceptable level of escapes during a rearing cycle.

**2.6 Predator control<sup>25</sup>**

| INDICATOR   | STANDARD                                       |
|---|--|
| 2.6.1 Evidence of implemented best practices and means of mitigation for predator problems on farms. <sup>26</sup> The evidence must encompass the following areas of concern and practices:<br>- Adequate siting of farms (routes of migratory predators)<br>- Predator deterrence | Yes  |
| 2.6.2 Use of lethal predator control  | None (see exception in footnote) <sup>27</sup> |
| 2.6.3 Allowance for use of lead shot for predator control   | None   |

**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 effect 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 behavior and local dispersal patterns of the predacious species that may ultimately affect the health of those populations. These standards require farms to implement measures that reduce interactions between the farm and predators.

<sup>25</sup> Predator: Any animal that preys on other animals

<sup>26</sup> To determine appropriate mitigation measures, a farm will need documentation from a third party that analyzes the farm’s siting and potential predators. Documentation can be based on an EIA or any other credible process of environmental assessment performed by a capable third party accredited by the relevant national authority or regulator.

<sup>27</sup> The standard permits an exception to the prohibition on lethal action in situations where the farm can provide evidence of a third-party 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. The assessment must come from an EIA or any other credible process of environmental analysis performed by a capable third party accredited by the relevant national authority or regulator.

The intentional killing of animals that prey on cultured trout is inappropriate for farms certified under these standards and, therefore, is not allowed. The FTAD recognizes that, in rare occasions, a farm may encounter exceptional circumstances that might merit lethal action against a predator. The standards, therefore, permit an exception to the prohibition on lethal action in situations where the farm can provide evidence of a third-party 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. The assessment must come from an EIA or any other credible process of environmental analysis performed by a capable third party accredited by the relevant national authority or regulator.

## PRINCIPLE 3: MINIMIZE NEGATIVE EFFECT ON WATER RESOURCES

*Impacts: Trout farms can potentially alter natural water flow, impact water-table and groundwater depletion, allow saltwater intrusion into groundwater, create an effluent quality and load problem, as well as have an overall impact on receiving body of water.*

### 3.1 Water Use/ Abstraction

| INDICATOR   | STANDARD |
|---|----------|
| 3.1.1 Adherence to abstraction levels and limits as identified by a site-specific credible environmental assessment (see Appendix II-A) conducted within the past 5 years <sup>28</sup> | Yes      |
| <i>The following indicator applies if the site-specific credible environmental assessment determines that groundwater depletion or saltwater intrusion may be a risk.</i>               |          |
| 3.1.2 Change in specific conductance from initial audit in drilled freshwater aquifer (groundwater) wells.  | ≤10%     |

#### *Rationale Statement-*

Altering the natural water flow can result in ecological impacts that affect the ability of a river to support its natural ecosystem and populations of flora and fauna. Significant reductions in water flow could also present possible conflicts with other users of a river system. Excessive water use can also alter or deplete groundwater reserves.

These standards seek to ensure that a farm’s abstraction rate is based on the recommendation of a credible environmental assessment. The purpose of the assessment is to analyze the farm’s potential impacts from abstracting water from the fresh water system, and recommend an abstraction rate that maintains the system’s natural ecosystem functions, even in natural periods of low water flow. The assessment must at a minimum analyze the issues described in Appendix II-A and be conducted by an accredited third party or by a government regulator.

Because fresh water systems are dynamic, the standard requires an assessment conducted within the last 5 years. In addition, certified farms will need to provide new assessment data every 5 years.

#### *Groundwater Impacts*

Groundwater salinization and other impacts from altered water chemistry can impact natural population dynamics in a river. Such impacts can also create conflicts with other users of a water source. In some regions, commonly those near the ocean, saltwater intrusion into freshwater aquifers can be an impact of trout farming. Over pumping can lower the head in aquifers, allowing saline water to enter. When an

<sup>28</sup> The assessment must be conducted by a third party accredited by the relevant government regulator, or by government scientists as part of a farm’s licensing process. The assessment must contain at a minimum the elements described in Appendix II-A

impact assessment determines that groundwater depletion or saltwater intrusion may be a risk, the farm must measure specific conductance at the point where groundwater enters the system. Specific conductance has been selected because it is more accurate than salinity at lower concentrations of total dissolved solids. Limiting the change in specific conductance to less than or equal to 10% from the first audit ensures that there is little fluctuation in water quality, while small errors or natural fluctuations are taken into account.



### Additional Information

Measuring groundwater level was also considered as an indicator. However, it is difficult to effectively measure a physical drop in groundwater level of an aquifer. The use rate, rainfall and overall recharge rates can be estimated but it becomes a theoretical calculation. Similarly it is difficult to directly correlate the impact of one farm on complex and sometimes large freshwater aquifers. Because of these reasons, it is preferable to define an acceptable specific conductance percent change in true freshwater aquifers that sit within regions with high saltwater intrusion risk. Certified trout farming operations should not contribute to the degradation of already compromised aquifers.

### Auditing Guidance

For conductance, use a conductivity meter (precision to 1 uS/cm), ISO 7888:1985 or equivalent.

## 3.2 Water Quality Effluent

| INDICATOR   | STANDARD  |
|---|---|
| 3.2.1 Total amount of nitrogen discharged in the aquatic environment per tonne of production (Formula and assumptions in Appendix II-B) <sup>29</sup> | TBD  |
| 3.2.2 Total amount of phosphorus discharged into the aquatic environment per tonne of production (Formula and assumptions in Appendix II-B)           | TBD  |
| 3.2.3 Receiving water quality monitoring assessment completed and validated (see Appendix II-C)   | Yes   |
| <i>The following standards apply to land-based production systems such as flow-through and recirculation systems</i>                                  |   |
| 3.2.4 Annual average concentration of dissolved oxygen in water measured 1 hour prior to sunrise at RWFA <sup>30</sup>                                | ≥ 6 mg/l  |
| 3.2.5 Sludge Best Management Practices are employed (See Appendix II-D)   | Yes   |
| <i>The following standards apply to cage production systems</i>   |   |

<sup>29</sup> The formulas in 3.2.1 and 3.2.2 are calculated over an entire production cycle. For the initial certification of a farm, the farmer must provide the calculation for the most recent batch of harvested fish. For subsequent certifications, the farmer must calculate it for all fish harvested during the previous 12 months.

<sup>30</sup> See Appendix II-C for a definition of RWFA.

|   |          |
|---|----------|
| 3.2.6 Evidence of adherence to production limits recommended by a credible assessment conducted within the past 5 years that analyzes the entire water body’s assimilative capacity, including other users. <sup>31</sup> Detailed components described in Appendix II-A. | Yes      |
| 3.2.7 Maximum annual average concentration of total phosphorus at RWFA  | TBD ug/L |
| 3.2.8 Annual average concentration of dissolved oxygen in water measured 1 hour prior to sunrise at RWFA.   | ≥ 6 mg/l |

*Rationale Statement:*

Excessive effluent discharges from trout farming can negatively impact the water quality of the receiving rivers or lakes. Nutrient pollution from uneaten food and fecal waste (mainly nitrogen, phosphorous and organic matter loading) can fuel changes in primary productivity and bacterial respiration, resulting in changes to water quality as well as flora and fauna population condition and dynamics. In extreme cases, excessive eutrophication can render zones in the water column uninhabitable to natural flora and fauna due to anoxia.

The standards restrict the amounts of nitrogen and phosphorus that can be discharged into the receiving waters by standardizing allotments of these nutrients on a production unit basis. While these restrictions (3.2.1 and 3.2.2) will enable the efficient use of nutrients, they can’t anticipate the actual impacts on receiving waters. Thus, the standards also require a minimum level of dissolved oxygen concentration that supports ecosystem function in the receiving water body. Although producers are often not solely responsible for the oxygen concentration in the receiving water body, there is a dependency by producers on the quality of the receiving water body. Oxygen concentrations will fluctuate based on the amount of photosynthesis and respiration occurring in the water. These processes, while dependent on nutrients, may not be able to be accurately predicted in the flowing water environments where farm wastes are discharged. Hence, with respect to land-based systems, the impact that is the greatest concern is the “effect” of eutrophication rather than relying on indicators of potential eutrophication. Until accurate indicators of potential eutrophication exist for flowing water environments (i.e. the concentrations of allowable nutrients and capacity of specific water bodies to assimilate those nutrients), depletion of oxygen is a logical “impact” of eutrophication that that should be reduced.

In lakes and reservoirs, water movement is lower than rivers and streams, and phosphorus accumulation in these water bodies is more stable. Thus, total phosphorus in lakes and reservoirs and the accumulation of phosphorus can provide a more accurate indication of nutrient loading in the water body. Moreover, assessments of assimilation potential in lakes and reservoirs can be developed to identify what are conservative levels of phosphorus to maintain to reduce impacts of eutrophication. Although nitrogen can be a limiting nutrient in freshwater systems, the volatility of nitrogen makes quantification and subsequent standards more difficult to set.

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<sup>31</sup> The assessment must be conducted by a third party accredited by the relevant government regulator, or by government scientists as part of a farm’s licensing process. The assessment, at a minimum, must address the issues described in Appendix II-A.

In addition to setting a total phosphorus concentration limit in the receiving water body for cage operations in lakes and reservoirs, the FTAD has applied the minimum dissolved oxygen concentration level acceptable in these water bodies. The intent of using this indicator and standard is identical to the justification for use in flowing water systems. The minimum concentration will allow for a final safeguard to prevent the effects of eutrophication in lakes and reservoirs where trout production occurs.

In an attempt to accurately determine what key indicators can presuppose the effects of eutrophication, the FTAD has developed a monitoring assessment that will link constituents of the receiving water with oxygen depletion. The monitoring assessment (Appendix II-C) requires knowledge of key water quality variables as well as physical and biological assessment of the receiving water body to develop a better understanding of the processes in a particular water body such that standards can be revised in the future for more accurate indicators of water pollution impacts. Chlorophyll-a can be used to estimate the amount of primary productivity in a water body and can indicate whether primary productivity has increased or decreased. Other concerns related to effluent include toxic effects from  $\text{NH}_3$ , the un-ionized form of ammonium, which can be estimated by measuring total ammonia nitrogen and pH.

The improper handling of sludge that accumulates on a farm can create oxygen demands in water or potentially release toxic metabolites. Cage production creates additional concerns because of the inability to process or treat waste and effluent. As the culture medium for cage production is the receiving water body further concerns are raised about the ability of the water body to assimilate nutrients from the farm.

#### **Additional Information for First Draft Review**

Setting global standards for farm effluents is an enormously difficult task because of the variety of receiving waters in trout production, and the different production systems. Attempts, such as the EU's Water Framework Directive, are being made to harmonize the effluent assessment approaches between countries, but so far there is no internationally agreed methodology that might be applied as standard operating procedure.

The draft standards under Criterion 3.2 seek to strike a balance between holding certified farms to a clear global standard, while recognizing the site-specific implications of a particular farm's effluents. The FTAD Steering Committee is seeking input during the public comment period about how well it has struck this balance, as well as the numerical limits for many of the standards. Specific areas in which comment would be most helpful include:

🚩 3.2.1 & 3.2.2 – These two formulas are aimed at creating a global benchmark for acceptable levels of nutrient release into the aquatic environment, regardless of production system or receiving environment. The formulas create an incentive for farms that dispose of sludge in an environmentally responsible way, and are more difficult for cage systems to comply with, since excess nutrients can't be captured through sludge. The formula accounts for nutrients captured in biological lagoons and settling ponds. If a farmer removes nutrients from the aquatic environment through other methods, the responsibility is on the farmer to demonstrate how many nutrients have been removed.

The SC continues to discuss the appropriate levels for these two standards, which should reflect best practice. One way to calculate the level is to assume a best-practice feed conversion ratio, the average content of nitrogen and phosphorus in trout feeds and an average retention ratio. Then the calculation could assume a certain percentage of nutrients could be captured in sludge and through filtering



techniques. Another input into the SC discussion is the Danish regulation, which describes traditional Danish farms as discharging on average 38 kilos nitrogen and 3 kilos phosphorus per tonne of fish produced, whereas higher performing operations discharge only 20-23 kilos per tonne nitrogen and 1.1-1.7 kilos per tonne phosphorus. The SC recognizes that differences in feed ingredients, such as land-animal proteins, may have an impact on how easily a farm might be able to meet this standard.

🚩 The FTAD SC is particularly concerned about the delicate ecosystems in lakes, and whether these standards provide sufficient safeguards against the risks of aquatic ecosystem damage. In particular, there is concern about the latent effects of nutrient loading in a lake that might cause a sudden collapse of a lake ecosystem that can't be reversed for a decade or more. One approach to address these concerns would be an additional standard that would ensure a cage production system is only located in a body of water that is capable of assimilating the farm's nutrient load. The SC welcomes input on methods to classify water bodies as well as types/characteristics of lakes in which certified trout cage production should be permitted.

🚩 The SC also recognizes that a farm located on a river can have impacts on a lake or reservoir downstream. The SC is considering how to address this concern.

🚩 3.2.7 & 3.2.8 - The FTAD SC seeks to include a measurable water-quality standard for cage production systems. Despite challenges related to defining effective thresholds for different water bodies in different regions, the SC believes this could be a promising option and welcomes specific suggestions on appropriate maximum phosphorus levels by water body type as well as an appropriate sampling methodology.

## **PRINCIPLE 4: PROACTIVELY MAINTAIN THE HEALTH AND WELFARE<sup>32</sup> OF CULTURED FISH AND MINIMIZE THE RISK OF DISEASE TRANSMISSION**

*Impact: Trout farms that don't implement bio-security measures and maintain their aquatic environment in optimum condition pose risks to wild populations through disease transfer and amplification. Stressful conditions on farmed fish increase risks from disease. The excessive or improper use of treatments can have toxic impacts on wild populations or alter habitats.*

### **4.1 Biosecurity management**

| INDICATOR  | STANDARD   |
|--|--|
| 4.1.1 A biosecurity plan for the farm that, at a minimum, includes all the items described in Appendix III   | Yes  |
| 4.1.2 A veterinary health plan for the farm that, at a minimum, includes all the items described in Appendix IV  | Yes  |
| 4.1.3 Inspection of the farm by a designated veterinarian <sup>33</sup> who specializes in aquatic animal health   | At least once per year, at a time when the site is in production |
| 4.1.4 Site visits from other fish health professionals (e.g., a company biologist or designated consultant) to address issues such as feed efficiency, water quality, fallowing and treatment protocols, incidence of disease, review of mortality records, efficacy of treatment strategies and malformations | At least four times per year                                     |
| 4.1.5 A crisis management plan for the farm that pertains to any eventualities that may threaten the health and welfare of fish stocks or have an impact on the environment (e.g., clinical disease outbreaks, flood incidents and escape incidents)   | Yes  |
| 4.1.6 Documentation that all suspicions of unexplained mortality have been reported to the relevant regulatory body and designated veterinarian  | Yes  |
| 4.1.7 Presence of a site-specific risk assessment that, at a minimum, addresses the origin of brood stock, ova, juvenile fish,   | Yes  |

<sup>32</sup> "Welfare" is defined here as functional welfare, meaning the fish is raised under environmental conditions that promote healthy growth and development incurring minimal stress.

<sup>33</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.

movements of live fish, site predators, flood risk and regional disease history

**Rationale–**

Creating and implementing risk-based farm management protocols (e.g., biosecurity plans and crisis procedures) and maintaining daily records on fish health and behavior are important tools for minimizing or eliminating the impact trout farming can have on the aquatic environment (on and off the farm). 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, as well as for all producers to be aware of the documents and understand their role in implementing them.

**4.2 Chemicals and treatments**

| INDICATOR   | STANDARD      |
|---|---------------|
| 4.2.1 Use of therapeutic treatments, including antibiotics or treatments, that are banned under European Union (EU) law   | Not permitted |
| 4.2.3 Prophylactic use of chemical antimicrobial (excluding probiotics) treatments  | Not permitted |
| 4.2.4 A treatments log for the farm that, at a minimum, includes the items described in Appendix IV   | Yes           |
| 4.2.5 Documentation of vaccination and medicated treatments used for juvenile fish introduced to on-growing site  | Yes           |
| 4.2.6 Vaccination against diseases that present a risk in the region and for which an effective and commercially viable vaccine exists, as determined by the farm’s designated veterinarian   | Yes           |
| 4.2.7 Mortality events are investigated immediately on site to determine and record the cause of death. In instances where mortality remains unexplained or unattributed, further investigation is pursued off-site with fish health professionals. | Yes           |

**Rationale**

The use of certain therapeutic treatments may impact upon human health or have a damaging effect on the aquatic environment, both in terms of water quality and direct impact on flora and fauna. The EU offers clear and easily accessible guidance (see: [http://ec.europa.eu/food/food/index\\_en.htm](http://ec.europa.eu/food/food/index_en.htm)) on permitted authorized treatments, including antibiotics, and banned treatments. EU regulation has been adopted as a benchmark for appropriate treatments in this global standard because of the experience of its regulatory agencies. In the interest of environmental monitoring and product traceability, all chemical treatments must be recorded in a special file or treatment log made available to auditors. Specific guidance on what information must be recorded is given in Appendix IV. Farming of fish can

lead to an increased risk of aquatic diseases in the environment. Therefore, it is appropriate that, where possible, a vaccination procedure is followed to minimize this risk and to prevent the necessity to use further treatments (e.g., antibiotics and traditional remedies). Mortality often is associated with disease or parasite presence, and where no immediate cause is evident further advice should be sought in order that there is minimal impact of the farm site on the external aquatic environment.

### 4.3 Environmental welfare

| INDICATOR  | STANDARD                                    |
|--|---|
| 4.3.1 O <sub>2</sub> levels monitored daily, using an oxygen meter <sup>34</sup>                                 | O <sub>2</sub> levels greater than 6mg/l    |
| 4.3.2 N-NO <sub>2</sub> levels monitored weekly  | N-NO <sub>2</sub> levels less than 0.1 mg/l |
| 4.3.3 N-NH <sub>3</sub> levels monitored weekly  | N-NH <sub>3</sub> levels less than 0.1 mg/l |
| 4.3.4 Detailed records of the numbers and weights of fish in tanks, ponds or cages and of movements between them | Yes   |
| 4.3.5 Maximum stock density is determined by the designated veterinarian   | Yes   |

#### Rationale

The health of aquatic ecosystems depends, in part, on the management techniques used at trout farms. Farms with good water quality, appropriate stocking densities and effective feeding strategies minimize stress levels on farmed fish and the chances they will transmit or amplify diseases in the wild.

The standards for on-site levels of toxic nitrogenous compounds are maximum thresholds and not intended to indicate an optimum target level. Similarly, the standard for oxygen levels is a minimum threshold and not intended as an optimum target. Fish health professionals may recommend additional water quality tests beyond what is covered in this standard.

#### Additional information for reviewing the first draft

Environmental welfare does not seek to address all issues relating to fish welfare. For example, harvesting of fish (humane slaughter) is not addressed because it was seen to be outside the scope of social and environmental standards.

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<sup>34</sup> Monitoring of water quality should be consistent (i.e., samples taken at evenly spaced intervals appropriate to providing sufficient and meaningful data).

## 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.*

### Additional information for reviewing the first draft

The FTAD SC has attempted to create a package of resource-use standards that balances the **efficient** formulation of feeds (and hence the associated use of all feed resources) and the **responsible** (precautionary and socially responsible) use of finite global resources. The two goals are sometimes compatible, and sometimes require trade-offs. These trade-offs are especially relevant for feed. For example, optimizing standards for **efficiency** alone creates incentives to increase wild fish inclusion rates, which could increase fishing pressure on forage fisheries and create aqua feed markets that marginalize the use of forage fish for direct human consumption. At the same time, efficient feeds minimize effluent outputs from farms, assure efficient use of nutrients and avoid issues such as land conversion and pesticide use associated with agriculture for vegetable proteins (e.g., soya beans). Related and reverse trade-offs exist if optimizing only for **responsible** use of resources.

Functionally, this principle attempts to a.) minimize impacts that may occur sourcing inputs b.) improve the net use of resources by promoting efficient conversion of feed into cultured trout c.) ensure that unavoidable waste streams are captured or disposed appropriately and d.) create market incentives for precautionary and socially responsible use of resources, to promote human wellbeing.

🚩 The SC welcomes feedback during the public comment period about how well the draft standards balance these trade-offs.

🚩 All numerical standards are tentative and still being reviewed by the Steering Committee; suggestions for alternative numbers will be welcomed when accompanied by a proposed rationale.

Given the current challenges in assuring responsible sourcing of marine feed ingredients for trout farmers, the FTAD SC supports the creation of a feed dialogue that will be better able to address these issues directly.

Similarly, the SC expects that, when these standards are revised in the next several years, there will be an additional requirement for the certification of key vegetable ingredients by independent, responsible-sourcing schemes. Appropriate third-party schemes do not yet exist for the main non-marine feed ingredients.

The SC also is considering whether these standards should require some kind of consumer labeling if certain feed ingredients are used, such as land-animal proteins or genetically modified ingredients.

### Criterion 5.1 Traceability and transparency of raw materials in feed

| INDICATOR   | STANDARD |
|---|----------|
| 5.1.1. Evidence of traceability, demonstrated by the feed producer, of all feed ingredients <sup>35</sup> | Yes      |

### Rationale

Traceability of raw materials is required to ensure their authentic origin. Traceability is a necessary first step to comply with the remainder of feed standards under this principle.

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

### Additional Information for reviewing the first draft

Assuring traceability of all feed inputs requires transparency at the feed manufacturer and producer level. The FTAD recognizes that there are costs and systems required to demonstrate traceability, and welcomes ideas about how feed manufacturers can minimize these costs.

🚩 The FTAD is considering whether or not the traceability information provided by the feed manufacturer needs to be audited. Also, the FTAD is considering whether the standards should include a timeframe for achieving certified chain of custody for ingredients.

### Criterion 5.2 Efficient and optimized diets

| INDICATOR   | STANDARD  |
|---|---|
| 5.2.1 Feed Conversion Ratio (FCR) - biological tons of feed used / ton of fish produced (including dead fish)   | For fish less than 500 grams: ≤ 1<br>For fish between 0.5 and 4 kg: ≤ 1.2 |
| 5.2.2 Protein digestibility (stripping) of nitrogen (nitrogen in feed – nitrogen in feces) / nitrogen in feed * 100%  | ≥ 85%   |
| 5.2.3. Retention of nitrogen and phosphorus<br>nitrogen in fish / (nitrogen in feed – nitrogen in feces) * 100%<br>phosphorus in fish / phosphorus in feed * 100% | Minimum 40% for nitrogen<br>Minimum 45 % for phosphorous                  |

### Rationale

This criterion is aimed at using feed in an **efficient** manner that optimizes the transfer of resources from

<sup>35</sup> Traceability should be at a level of detail that permits the feed producer to demonstrate compliance with the standards in this document. This standard also assumes that the feed producer will make available to the farm a full list of feed ingredients.

feed into cultured fish flesh. The efficient use of wild fish and other ingredients is addressed, first, by promoting efficient feed management by the farming operation, which will be reflected in a low Feed Conversion Ratio (FCR). Asking farmers to achieve threshold FCRs provides an incentive to accurately track fish weight and biomass, keep feed fresh, eliminate waste prior to use, and carefully track parameters to optimize feed uptake by fish (e.g., dissolved oxygen, presentation, frequency of offering, correct pellet size, and time of feeding). Second, appropriate protein digestibility assures that feed ingredients are processed gently to avoid unnecessary protein damage by temperature or chemical treatment, in order to optimize their metabolic uptake. Nitrogen provides a better proxy for digestibility than phosphorus. Third, retention of nitrogen and phosphorus requires that feed be formulated to maximize retention within fish for their growth. This is achieved by providing ingredients in the optimal balance to assure that amino acids are used for meat production rather than as a source of energy. The limit for phosphorus promotes efficient use of a limited resource and avoids unnecessary discharge of phosphorus into freshwater.

### **Auditing guidance**

The feed supplier must document digestibility and retention figures for the actual diet.

### **Additional Information for review of first draft**

Setting thresholds for these indicators requires trade-offs. The FTAD SC is still reviewing whether these numbers provide the right balance between promoting digestibility and retention, while not creating hurdles to moving toward vegetable sources of protein or hurdles to using fish trimmings. There also is a balance between increasing the amounts of healthy omega-3 fatty acids (EPA/DHA) in farmed fish, while limiting the pressure that trout farming might exert on wild forage fisheries through feed.

The SC recognizes that retention and digestibility tests involve costs and technology. The SC is open to ideas that would achieve a similar result to retention and digestibility tests at a lower cost.


The SC also is contemplating whether to require retention and digestibility test results to be audited.

The SC is contemplating the implications for these standards of farms that collect unused nutrients and put them to use as fertilizers.

The final standard will include detailed guidance around the methodology for calculating retention, digestibility and FCR.

### **Criterion 5.3 Responsible origin of marine raw materials**

| <b>INDICATOR</b> | <b>STANDARD</b> |
|------------------|-----------------|
|------------------|-----------------|

|  |   |
|--|---|
| 5.3.1 Timeframe for at least 90% fishmeal or fish oil used in feed to come from fisheries <sup>36</sup> certified under an ISEAL member's accredited certification whose primary goal is to promote ecological sustainability.   | <5 years following the date of the publication of the FTAD standards                    |
| 5.3.2 Prior to the achievement of 5.3.1, the FishSource score characterizing the fishery(ies) from which a minimum of 80% of the fishmeal or fish oil is derived. See Appendix V, subsection 4 for explanation of FishSource scoring.  | TBD  |
| 5.3.3 Prior to achievement of 5.3.1, 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." See Appendix V, subsection 3 for further details | 100%  |
| 5.3.4 Feed containing fishmeal and/or fish oil originating from by-products <sup>37</sup> or trimmings from fish species which are categorized as vulnerable, endangered, or critically endangered according to the IUCN Red List of Threatened Species. <sup>38</sup>   | None  |
| 5.3.5 By-product feed ingredients must not come from salmonids   | Yes   |
| 5.3.6 Fishmeal Forage Fish Dependency Ratio (FFDR <sub>m</sub> ) for grow-out (calculated using formulas in Appendix V, subsection 1)  | <1.31   |
| 5.3.7. Fish Oil Forage Fish Dependency Ratio (FFDR <sub>o</sub> ) for grow-out (calculated using formulas in Appendix V, subsection 1)   | <2.85   |

### Rationale

These indicators strive to ensure that marine-based feed ingredients come from responsible sources in

<sup>36</sup> This standard applies to fishmeal and oil from forage fisheries and not to by-products or trimmings used in feed.

<sup>37</sup> By-product: The left-over material after a fish is processed for human consumption, or a whole fish that, for quality reasons at the time of landing, is deemed by official regulations to be unsuitable for human consumption. For purposes of this standard, the same definition applies to land-animal by-products: Material left over after processing or material deemed unsuitable by regulatory authorities for human consumption (while still safe for use as a feed ingredient).

<sup>38</sup> The IUCN reference can be found at <http://www.iucnredlist.org/static/introduction>



the short- and long-term. A main concept of the proposed standards is to align industry incentives to support processes that will lead to improved fisheries management, and then certification, of forage fisheries.

Ultimately, the standards will use marine ingredients certified by a widely recognized authority, such as the Marine Stewardship Council (MSC), as the best option available to promote responsible harvest. In addition to MSC standards, any set of standards accredited by the ISEAL Alliance that promotes the ecological sustainability of pelagic fisheries as a primary focus could qualify.

Given the current lack of MSC certified sources of fishmeal and fish oil, the FTAD proposes to restrict fisheries currently known to have the poorest status from being used for fishmeal and oil and to place traceability requirements on the fishmeal and oil used in the feed. This will be achieved by requiring the vast majority of marine ingredients to come from a fishery that receives a minimum score using the FishSource methodology. The standard requires 80% of the fishmeal and fish oil to meet the FishSource score because the products are sold as blends, where the origin of fisheries can come for multiple fisheries.

In addition, these standards require marine feed ingredients to immediately be certified under a scheme that ensures compliance with the key principles of the FAO “Code of Conduct for Responsible Fisheries”<sup>39</sup> and demonstrates chain of custody. The International Fishmeal and Fish Oil Organization (IFFO) certification of fisheries products is once such certification.<sup>40</sup>

These standards support the use of marine trimmings and by-products, as long as they don’t come from endangered or vulnerable fisheries, or from other salmonids due to disease risks. Using by-products can result in higher FCRs, resulting in tradeoffs between effluent concentration and efficient use of marine resources. The FTAD attempts to address this tradeoff by creating an FCR standard and having rigorous effluent standards in Principle 3.

The FFDRs for fishmeal and fish oil seek to provide incentives for farmers to limit the pressure they exert on forage fisheries.

#### **Additional Information for review of first draft**

The FTAD SC is still considering a number of issues related to Criterion 5.3.

🚩 The FTAD is considering whether to require 90% of fishmeal and fish oil to come from certified sources, such as MSC, in the future, or whether a higher percentage is needed. Similarly, the SC is debating whether 80% or a higher percentage should be included immediately under the FishSource score.

🚩 The SC is also still considering what FishSource score to use for the next five years.

One option would be to require no individual score of less than 6.0, a maximum of one N/A, and no N/A in the biomass stock assessment category. This represents a very low bar, but is perhaps realistic given

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<sup>39</sup> <http://www.fao.org/fishery/en>

<sup>40</sup> More information on the IFFO standard is included in Appendix IV

the current status of available information on forage fisheries used in aqua feeds, particularly in South East Asia. For reference, a fishery that receives a FishSource score of 6 on everything would be a fishery where:

**Score 1:** The "precautionary" management approach is to hold harvest at the target reference point when biomass drops below the limit reference point

**Score 2:** Total Allowable Catch has been set 25% higher than under scientific advice

**Score 3:** The quota is being exceeded by 25%

**Score 4:** The spawning biomass is at half of its target for maximum sustainable yield

**Score 5:** Mortality is 50% higher than what is set for acceptable fishing mortality at maximum sustainable yield

A second, more ambitious, option would insist on progress towards information and management action for forage fisheries by accepting the above for the next three years (or some other time period) and require forage fisheries to score 8 on one or more FishSource scores within three years following initial farm certification. This would generate a strong market incentive for farmers and feed companies to push for better fisheries monitoring and management.

An additional option could be introduced for data-poor fisheries that currently represent a sizeable proportion of fishmeal and fish oil inputs into aqua feeds in Southeast Asia. These fisheries are disadvantaged by a lack of infrastructure, governance and appropriate incentives to manage responsibly. For fisheries where no stock assessments have been conducted, there is currently no possibility of obtaining FishSource scores. These fisheries should be strongly encouraged to promote data collection as a first step towards responsible use, and market dollars may be needed either directly, or as an incentive to take action. Therefore, an additional allowance could be made for use of fishmeal and fish oil from stocks in countries that can demonstrate the absence of stock assessment information but at extremely low levels for any given stock and where quotas are set in a way that is inversely proportionate to certainty of stock status (i.e., conceptually consistent with the MSC Risk-Based Framework, but without associated costs). Such an option would need, at a minimum, to be clearly accompanied by something such as a written articulation of the plan for data collection, agency responsibility, plans for stock assessment and peer review, associated timeframes, enforcement and auditing.

🚩 In addition, the SC is considering whether to allow farms to comply with either 5.3.2 or 5.3.3 prior to achieving 5.3.1, rather than having to comply with both.

🚩 The SC would appreciate feedback on whether stakeholders support the use of trimmings and by-products that come from stocks with poor status, or that are currently managed in an unsustainable manner (while not having legally designated status as vulnerable or endangered). The trade-off associated with excluding the use of such trimmings and by-products is that additional wild forage fish could be used in place of what are currently waste products.

FFDR standards are included because many stakeholders in the FTAD see the need for additional safeguards for pelagic fisheries. These fisheries are extremely important to the well being of marine food webs, and existing science does not currently understand the impacts of removing forage fish in large quantities from the base of the marine food chain.

Even in the presence of an ISEAL-compliant certification of forage fisheries, many stakeholders believe it is precautionary and socially responsible to encourage a reduction in the dependence on globally finite wild forage species. This reduction is already happening due to market realities of supply and demand for fishmeal and fish oil.

Forage fisheries serve multiple purposes, being both ingredients for aqua feeds as well as direct food items for humans. As human food, forage fisheries often are sustainable (i.e., rapid life cycles, early age at maturity, highly fecund and can be harvested by low impact gears) and important sources of EPA/DHA that are needed for human development. Particularly in developing countries and within local economies, forage fish such as anchovies, sardines and mackerel can be vital sources of protein and essential fatty acids. Inefficient conversion of wild fish, used for subsistence, into farmed fish for discretionary consumption represents a meaningful issue of equity and food security. By limiting forage fish inclusion rates, these standards will not create additional market demand to direct high proportions of forage fish into aqua feeds.

Other FTAD stakeholders have argued against including FFDR. For these stakeholders, once a feed source becomes a certified responsible fishery, farms should feel free to use it. Also, limiting aquaculture from using fishmeal and fish oil from responsible sources may not promote human consumption, given that other users (such as livestock farmers) who are less efficient than fish farmers at producing protein, would likely use it instead. Limiting amounts of marine ingredients also has implications for feed retention, digestibility and a farmed fish's nutritional value.

🚩 The FTAD SC welcomes public input on this issue.

**Criterion 5.4 Responsible origin of non-marine raw materials in feed**

| INDICATOR  | STANDARD  |
|--|---|
| 5.4.1 Presence and evidence of a responsible sourcing policy for the feed manufacturer for feed ingredients which comply with internationally recognized moratoriums and local laws. <sup>41</sup> | Yes   |
| 5.4.2 Documentation of the use of transgenic <sup>42</sup> plant raw material, or raw materials derived from genetically modified plants, in the feed.   | Yes, for any raw material with transgenic ingredients in a proportion greater than 1% |

**Rationale**

The FTAD standards aim to exclude feed ingredients that are sourced from areas where significant ecological damage has occurred. This will be achieved by requiring producers to provide evidence that

<sup>41</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>42</sup> Transgenic: Containing genes altered by insertion of DNA from an unrelated species. Taking genes from one species and inserting them into another species to get that trait expressed in the offspring..

they are sourcing feed products from feed manufacturers who 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.

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).

Genetically modified 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 that they are purchasing. By ensuring that information shall be available if needed, one can assure that this information is present to buyers (e.g., retailers) who would like to consider this when purchasing their products. If the feed contains genetically modified plant raw material, or raw materials derived from genetically modified plants, trout producers must be able to provide information to the buyer documenting their use. Trout producers will need to collect information regarding raw materials that are derived from genetically modified material from their feed producer.

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

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

| INDICATOR   | STANDARD                                |
|---|---|
| 5.5.1 Presence of records and evidence of energy consumption on farm (the site to be certified), and evidence of an energy use assessment   | Yes, measured in kilojoule/mt fish/year |
| 5.5.2 Records of green house gas (GHG <sup>43</sup> ) emissions on farm (the site to be certified) completed according to recognized methods and standards during grow-out and evidence of an annual GHG emission reduction assessment. | Yes                                     |

<sup>43</sup> For the purposes of this standard, GHGs are defined as the six gases listed in the Kyoto Protocol: carbon dioxide (CO<sub>2</sub>); methane (CH<sub>4</sub>); nitrous oxide (N<sub>2</sub>O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); and sulphur hexafluoride (SF<sub>6</sub>).

### Rationale

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

### Additional information for review of first draft

- Guidance still needs to be developed for conducting these assessments.

### Criteria 5.6 Non-therapeutic chemical inputs

| INDICATOR  | STANDARD |
|--|----------|
| 5.6.1 Percentage of combustibles contained in bunds <sup>44</sup>  | 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 an accredited waste management company                      | 100%     |
| 5.6.4 Percentage of chemical containers reused or turned over to an accredited waste management company                    | 100%     |
| 5.6.5 Percentage of non-hazardous, non-recyclable wastes turned over to an accredited waste management company or landfill | 100%     |
| 5.6.6 Percentage of non-hazardous recyclable wastes reused or turned over to a recycling company                           | >50%     |

### 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

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<sup>44</sup> Bund: An embankment, retaining wall, dyke or quay along a waterway.

of such hazardous materials must be done responsibly, according to their respective potentials 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 standard for the percentage of recycled waste reflects the fact that some farms are in extremely remote locations with no viable recycling systems nearby. Still, we believe it is important to set a minimum percentage of recycled waste in the standards, knowing that many farms may be able to greatly exceed that minimum.

#### **Auditor guidance**

5.6.1: Bunds must be waterproof, with a capacity of 110% of the volume of combustible stored, and must not have any drain (rainwater needs to be pumped or scooped periodically).

5.6.2: Dry chemicals must be protected from humidity inside buildings. All containers of liquid chemicals must close hermetically. Access to all chemicals should be restricted to authorized personnel.

5.6.3 to 5.6.5: The FTAD appreciates that shrimp farms are generally located in remote areas where accredited waste management companies are not necessarily established or accessible, and farmers need to demonstrate the use of the most responsible disposal solutions based on local possibilities. In case of absence of a managed landfill in the area, shrimp 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. Non-organic wastes must not be burned on site because of the possible emissions of toxic gases.

5.6.6: Recyclable wastes need to be identified and separated at the point of generation. Some wastes (e.g., feed bags and plastic containers) can be reused, and their return to suppliers should be encouraged. When selling recyclable wastes to a local collector, the final destination of wastes should be determined. The income generated by the sales of recyclable wastes should be used to create incentives for employees to separate wastes and increase the percentage of recycling.

## PRINCIPLE 6: BE SOCIALLY RESPONSIBLE

Impact *This Principle addresses key labor 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 FTAD’s labor standards if it can demonstrate compliance with SA 8000 (a Social Accountability International labor certification program) or an equivalent labor certification scheme that is approved by ISEAL.

### **Additional information for review of first draft**

*SAI, an international and renowned social standards and labor NGO, worked with the Aquaculture Dialogues to recommend ways to best align these aquaculture labor standards with ILO conventions and best practice. SAI’s work included site visits to several tilapia and pangasius farms in order to provide input on how the standards might address the reality of labor and social practices in aquaculture.*

### **6.1 CRITERIA: Child Labor**

|       | INDICATOR   | STANDARD |
|-------|---|----------|
| 6.1.1 | Number of incidences of child <sup>45</sup> labor <sup>46</sup> | None     |

#### **Rationale**

Adherence to the child labor codes and definitions included in this section indicates compliance with what the ILO and international conventions generally recognize as the key areas for the protection of child and young workers.<sup>47</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>48</sup> to their physical or mental well-being. To this end, the standards

<sup>45</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>46</sup> Child labor: Any work by a child younger than the age specified in the definition of a child.

<sup>47</sup> Young worker: Any worker between the age of child, as defined above, and under the age of 18.

<sup>48</sup> Hazard: The inherent potential to cause injury or damage to a person’s health (e.g., unequipped to handle heavy machinery safely, and unprotected exposure to harmful chemicals). Hazardous work:

related to what constitutes child labor will protect the interests of children and young workers in certified aquaculture operations.

**Auditing guidance**

- Minimum age of permanent workers is 15 years old. If the legal minimum age allowed in the country is higher than 15, the legal minimum age of the country is followed. (Note: Employer is accountable for employee age documentation. In most countries, the law states that the general minimum age for employment is 15 years.)
- Child workers under the age of 15 perform only light work, as long as it does not exceed 2 hours per day on school days or holidays. According to the ILO convention 138, article 6.1, light work is work that is 1) not likely to be harmful to a child’s health or development and 2) not likely to prejudice their attendance at school, participation in vocational orientation or training programs, or diminish their capacity to benefit from instruction received. Also, the total number of hours spent on light work and on school shall not exceed 7 hours per day. (Note: Per ILO C 138, Article 6.4, some developing countries may apply for an exception to the minimum age, thereby defining 12 as the minimum age for light work by children and 14 for the minimum age for young workers; few if any countries still invoke this clause.)
- For employees aged 15-18 (who are defined as young workers), work shall not conflict with schooling and the combined daily transportation time, school time and work time shall not exceed 10 hours. Hazardous work (e.g., heavy lifting disproportionate to a person’s body size, operating heavy machinery, working night shifts and exposure to any toxic chemicals) is not performed by those below age 18.

**6.2 CRITERIA: Forced, Bonded, or Compulsory Labor**

|     | INDICATOR   | STANDARD |
|-----|---|----------|
| 6.2 | Number of incidences of forced <sup>49</sup> , bonded <sup>50</sup> or compulsory labor | None     |

**Rationale**

Forced labor—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 labor 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 leave the workplace and

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Work that, by its nature or circumstances in which it is carried out, is likely to harm the health, safety or morals of workers.

<sup>49</sup> Forced (Compulsory) Labor: All work or service that is extracted from any person under the menace of any penalty for which a person has not offered him/ 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>50</sup> Bonded labor: When a person is forced by the employer or creditor to work to repay a financial debt to the crediting agency.



manage their own 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 labor forces.

**Auditing guidance**

1. Contracts shall be clearly stated and understood by employees and never lead to an employee being indebted (such as employees paying for essential job training programs).
2. Employees shall be free to leave the workplace and manage their own time.
3. Employer shall never be permitted to withhold an employee’s original identity documents. (Note: Extra care shall be given to migrants, contractors and subcontractors because they can be particularly vulnerable without their identity documents.)

**6.3 CRITERIA: Discrimination<sup>51</sup> in the work environment**

|       | INDICATOR  | STANDARD |
|-------|--|----------|
| 6.3.1 | Evidence of proactive anti-discrimination practice <sup>52</sup> | Yes      |
| 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 anti-discrimination 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 minimization of discrimination.

**Auditing guidance**

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<sup>51</sup> Discrimination: Any distinction, exclusion or preferences, which 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 favor of people from certain underrepresented groups may be legal in some countries.

<sup>52</sup> Employers shall have written anti-discrimination policies stating the company does not engage 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.

Evidence of proactive anti-discrimination policies and practices (6.3.1)

1. Employers shall have written anti-discrimination policies stating the company does not engage 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.
2. Anti-discrimination policy is publically displayed, very clear for all employees to see and understand, and translated into appropriate languages.
3. Clear and transparent company procedures are outlined to raise, file and respond to discrimination complaints.
4. Employers shall respect the principle of equal pay for equal work.

Evidence of incidences of discrimination (6.3.2)

1. Worker testimony shall be able to support that the company does not interfere with the rights of personnel to observe tenets or practices, or to meet needs related to race, caste, national origin, religion, disability, gender, sexual orientation, union membership, political affiliation or any other condition that may give rise to discrimination.

**6.4 CRITERIA: Work environment health and safety**

|       | <b>INDICATOR</b>   | <b>STANDARD</b> |
|-------|--|-----------------|
| 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             |

**Rationale**

A safe and healthy working environment is essential for protecting workers from harm. It is critical for a responsible aquaculture operation to minimize 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. 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% of employee costs in a job-related accident or injury.

**Auditing guidance**

Percentage of workers trained in health and safety practices, procedures and policies (6.4.1)

1. There shall be evidence of pro-active risk assessments, as well as evidence of minimization of hazards and risks in the working environment, including documented systemic procedures and policies to prevent workplace hazards. The information shall be available to employees.
2. Emergency response procedures shall exist and be known by employees.
3. Offer regular health and safety training for employees, including training on potential hazards and risk minimization, once a year and for all new employees.
4. Offer regular health and safety training for employees, including training on potential hazards and risk minimization, once a year and for all new employees. Employees should be able to articulate a basic understanding of risks.

Determining health and safety related accidents, violations recorded and corrective actions taken (6.4.2)

1. Documentation shall be generated with regards to occupational health and safety violations.
2. Corrective action plan shall be implemented in response to accidents that have occurred. This should analyze the root causes, address the root causes, and remediate and prevent future accidents of a similar nature.

Proof of accident insurance (6.4.3)

1. There shall be sufficient insurance to cover employees who suffer accident or injury in the work environment. Special consideration must be given to migrant or foreign workers who may fall outside of the law.

Appropriate PPE

1. Appropriate PPE will depend on the specific characteristics of a farm and culture system. Suitable clothing will include protection from identified risks, including disease risks. In order to identify appropriate risks, producers shall create a list of safety risks, as well as a list of chemicals used (and standard PPE for each), for workers in all categories, including drivers and veterinarians.

**6.5 CRITERIA: Wages**

|       | INDICATOR  | STANDARD |
|-------|--|----------|
| 6.5.1 | The percentage of employees who are paid a basic needs wage. <sup>53</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>54</sup> of workers and provide some discretionary income. Certified aquaculture

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<sup>53</sup> Basic needs wage: Enables workers to support the average- size 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>54</sup> Basic needs wage: Enables workers to support the average- size 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).

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

**Auditing guidance**

Determining the percentage of employees who are paid fair and decent wages

1. Employers shall ensure that wages paid for a standard working week (no more than 48 hours) always, at a minimum, meet legal and industry minimum standards and basic needs of personnel. Minimum basic needs wages, as defined by national and local regulation, are sufficient in countries and regions where the minimum wage is thoughtfully and transparently calculated to reflect the true local cost of living. Companies, particularly those in regions where the national or regional minimum wage may not be sufficient, should show evidence that they have assessed what workers actually need to cover the cost of living for workers and their families.
2. No deductions in pay for disciplinary actions.
3. Wages and benefits are clearly articulated to employees and are rendered to employees in a convenient manner. Employees don't need to travel to collect benefits. Promissory notes, coupons or merchandise never replace cash, electronic or check payment methods.
4. Labor-only contracting relationships or false apprenticeship schemes (see definitions below) are not acceptable. This includes revolving and consecutive labor contracts to deny benefit accrual.
5. False apprenticeship scheme: The practice of hiring workers under apprenticeship terms without stipulating terms of the apprenticeship or wages under contract is a "false" apprenticeship, as its purpose is to underpay people, avoid legal obligations or employ children.
6. Labor-only contracting arrangement: The practice of hiring workers without establishing a formal employment relationship for the purpose of avoiding payment of regular wages or the provision of legally required benefits, such as health and safety protections.
7. A clear and transparent mechanism for wage setting shall be known to employees.
8. A labor conflict resolution policy shall be in place to track conflicts and complaints raised, as well as responses to conflicts and complaints.

**6.6 CRITERIA: Access to freedom of association and the right to collective bargaining<sup>55</sup>**

|       | INDICATOR  | STANDARD |
|-------|--|----------|
| 6.6.1 | Incidences of employees denied freedom to associate, the ability to bargain collectively or denied access to representatives 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

<sup>55</sup> Bargain collectively: A voluntary negotiation between employers and organizations of workers in order to establish the terms and conditions of employment by means of collective (written) agreements.

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.

**Auditing guidance**

Determining the percentage of employees with access to trade unions and ability to bargain collectively or worker access to representative(s) chosen by workers without management interference.

1. Workers have the freedom to form and join any trade union, free of any form of interference from employers or competing organizations set up or backed by the employer. ILO specifically prohibits “acts which are designated to promote the establishment of worker organizations or to support worker organizations by financial or other means, with the object of placing such organizations under the control of employers or employers’ organizations.”

**6.7 CRITERIA: Disciplinary practices**

|       | INDICATOR   | STANDARD |
|-------|---|----------|
| 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 worker’s performance <sup>56</sup> | Yes      |

**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>57</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 standard.

**Auditing guidance**

Determining incidences of abusive disciplinary actions

- There shall be absolutely no engagement in or support of corporal punishment, mental or physical coercion, or verbal abuse. Fines or wage deductions shall not be acceptable as a method for disciplining workers. A farm’s stated policies and worker testimony will help an auditor gauge this.

Evidence of non-abusive disciplinary policies and procedures

- 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 or her go. A farm’s stated policies and worker testimony will help an auditor gauge this.

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<sup>56</sup> If disciplinary action is required, progressive verbal and written warnings shall be engaged. Aim should always be to improve the worker before letting him/her go. (Indicated by policy statements as well as evidence from worker testimony)

<sup>57</sup> Mental abuse: Characterized by the intentional use of power, including verbal abuse, isolation, sexual or racial harassment, intimidation, or threat of physical force.


## 6.8 CRITERIA: Overtime and working hours

|     | INDICATOR   | STANDARD |
|-----|---|----------|
| 6.8 | Violations or abuse of working hours <sup>58</sup> and overtime <sup>59</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>60</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

|       | INDICATOR   | STANDARD  |
|-------|---|---|
| 6.9.1 | Evidence of a third-party assessment <sup>61</sup> that evaluates the impact a farm is having on the surrounding communities, including, at a minimum, an analysis of: <ul style="list-style-type: none"> <li>▪ Economics</li> <li>▪ Natural resource access and use</li> <li>▪ Human assets</li> <li>▪ Physical infrastructure</li> <li>▪ Social and cultural resources</li> <li>▪ Governance</li> </ul> | Yes  |
| 6.9.2 | Evidence of regular communication and consultation with surrounding communities   | Yes   |
| 6.9.3 | Evidence of a functioning grievance and conflict resolution mechanism <sup>62</sup> addressing concerns raised by the local community   | Yes   |

<sup>58</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>59</sup> All overtime shall be paid at a premium and should not exceed 12 hours per week. 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>60</sup> Premium rate: A rate of pay higher than the regular work week rate. Must comply with national laws/regulations and/or industry standards.

<sup>61</sup> The impact assessment must be done by a credible third party accredited by the relevant national authority or regulator. See Appendix I for a consolidated list of environmental and social data that a farm must have.

<sup>62</sup> The grievance procedure must ensure that all grievances are recorded and filed, and corrective actions are taken and documented. An appeal process needs to be available if stakeholders feel that they have not been heard.

## **Rationale**

These standards are informed by the ISEAL “Code of Good Practice for Assessing the Impacts of Social and Environmental Standards Systems” and a livelihoods framework that analyzes the objectives, scope and priorities for development. The following six areas emerge as priorities when assessing a farm’s interaction with local communities.

- Economic aspects (e.g., the influence of aquaculture on employment, conflict with or substitution of other livelihood strategies, poverty issues and income changes)
- Natural resource access and use aspects – such as access to natural resources, land and water tenure, influences on quality and quantity of other natural resources used by communities.
- Human assets (e.g., food security, human health and safety, security risks, education and training, indigenous knowledge and practices)
- Physical infrastructure (e.g., access to roads, electricity, telephones, changes in infrastructure and transport, housing, waste disposal systems)
- Social and cultural aspects (e.g., cultural institutions and resources; indigenous rights and beliefs; gender, ethnicity and age disparities; and social networks)
- Governance – (e.g. conflict management, community interaction with the farm and community input on decisions that will affect the community)

The social impact assessment data required under this standard is designed to look at these six areas outlined in Appendix I. In addition, the standard requires mechanisms that enable regular consultation 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.

### **Additional information for review of first draft:**

🚩 The SC sees the social impact assessment requirements of 6.9.1 as particularly relevant for new farms. The SC is debating how extensive an assessment is required for existing farms, and welcomes feedback on the appropriate detail and scope of this information.

The intent of this standard is to ensure a farm is aware of any social impacts it might be having on surrounding communities. The Steering Committee understands that disputes between farms and other users of the aquatic environment can occur. These disagreements sometimes are commercial disputes. The three standards in this criterion don't suggest that all disputes can, or must, be resolved. Rather, the farm must demonstrate that it understands the impacts it might have, has consulted with surrounding communities and other users around those impacts, and has a grievance mechanism in place to address disputes. An unresolved dispute is not sufficient grounds to prevent a farm from meeting the standard. At the same time, the standards are intended to require a farm to be responsive to concerns and resolve most concerns. The SC welcomes input on how to refine the standards to reach these goals.

The standards may benefit from an adaptation of the Institute of Social and Ethical Accountability (ISEA) AA1000 AccountAbility standard. That standard aims to assist an organization in the definition of goals and targets, the measurement of progress made against these targets, the auditing and reporting of performance and in the establishment of feedback mechanisms (AA1000 Accountability Principles Standard 2008). There are three AA1000 AccountAbility Principles, one of which is a foundation principle of inclusivity. The other two principles relate to materiality and responsiveness. Inclusivity is the starting point for determining materiality. The materiality process determines the most relevant and significant issues for an organization and its stakeholders. Responsiveness is defined as the decisions, actions and performance related to those material issues.

The SC has considered using defined percentages of “conflicts resolved.” The SC also has looked at other ideas, such as explicit prohibitions against using bribes to resolve issues related to the community, or requiring that, in situations where compensation is required to be paid to communities, the amounts and persons receiving these amounts are disclosed.

#### **Auditing guidance**

- For 6.9.2, these community engagement mechanisms may include functioning multi-stakeholder committees, meeting reports signed by concerned parties, agreed upon aquaculture farm policy documents. Evidence presented should ensure that people and groups directly affected by aquaculture farm operations are engaged. Monitoring should be conducted, appropriate to the scale of aquaculture operations.



## Appendix I: Assessment of data needed to comply with FTAD standards

The FTAD standards require a farm to have certain environmental and social assessment data that will allow the farm to demonstrate compliance with specific standards. Below is a summary of the documentation needed. This information can come from an Environmental Impact Assessment (EIA). It also can come from any other credible environmental or social assessment performed by a third party accredited by the relevant national authority or regulator. 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, it will need to commission a new assessment to fill in the gaps of information that it does not have. If there have been changes made to an existing farm, a new assessment will be needed to review the pertinent sections of the assessment.

### **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
  - habitat for species listed on the IUCN Red List of Threatened Species as vulnerable, near threatened, endangered or critically endangered
  - natural wetlands
- Recommendations for providing equivalent habitat within one kilometer of the farm, if the farm is located in habitat for species listed on the IUCN Red List of Threatened Species as vulnerable, near threatened, endangered or critically endangered
- mitigation measures in line with the requirements in Criterion 2.2, if wetlands were converted to create or expand the farm
- the mean medium width of the riparian buffer, if the mean medium width meets Criterion 2.1
- an analysis of the farm's impact on the riparian buffer zone(s) and specific time-bound recommendations to mitigate the farm's impact on such zone(s)
- an analysis of predators that might impact the farm
- Recommendations for a predator mitigation plan
- an analysis of why any exception lethal actions against predators would not negatively effect wild populations or ecosystems, as well as specific limits on such actions

### **Principle 3**

See requirements under Appendix II-A

### **Principle 6**

The assessment of community impacts should, at a minimum, look at the following six areas:

- Economic aspects (e.g., the influence of aquaculture on employment, conflict with or substitution of other livelihood strategies, poverty issues and income changes)
- Natural resource access and use aspects – such as access to natural resources, land and water tenure, influences on quality and quantity of other natural resources used by communities.
- Human assets (e.g., food security, human health and safety, security risks, education and training, indigenous knowledge and practices)
- Physical infrastructure (e.g., access to roads, electricity, telephones, changes in infrastructure and transport, housing, waste disposal systems)
- Social and cultural aspects (e.g., cultural institutions and resources; indigenous rights and beliefs; gender, ethnicity and age disparities; and social networks)
- Governance – (e.g. conflict management, community interaction with the farm and community input on decisions that will affect the community)

## Appendix II: Methodologies related to Principle 3 – Water Resources

### Appendix II-A: Environmental Assessment Minimum Requirements (Water Abstraction, Assimilative Capacity of Lake)

#### WATER ABSTRACTION

Credible environmental information related to water abstraction must include -- at a minimum -- the following components:

- flow of river including seasonal changes,
- capacity of groundwater when applicable,
- geological factors
- mapping all other users of a river systems for competing uses / cumulative water abstraction impacts of all farms
- risk of salt water intrusion or increased salinity due to factors including distance from saltwater and geology (porosity of substrate, rainfall, other recharge factors).
- site-specific allowable abstraction/ diversion rate (critical level defined as a percentage and considered over the course of a year),

🚩 These requirements require further clarification and detail.

#### ASSIMILATIVE CAPACITY OF LAKE

The concept of assimilative (carrying) capacity generally refers to the maximum amount of pollution that an ecosystem can withstand without causing degradation of ecosystem structure and function. Certified freshwater trout grown in cages in lakes should not exceed the particular carrying or assimilative capacity of the water body. A water body's assimilative capacity varies based on the water body's specific characteristics. Environmental characteristics as well as all users of the body will impact a single's farm's acceptable discharge level in relation to the greater assimilative capacity.


A water quality model shall be developed and (its results adhered to) for any water body in which a certified trout farm is operating. Many models exist that can help determine assimilative capacity. The FTAD SC will not favor one existing model over another but we feel it is important to outline key elements of a credible assimilative capacity study.

A credible model shall fulfill two basic criteria: (1) The model must include the main compartments and processes that reflect the role of trout farming as an agent of chemical fluxes (particulate organic carbon, dissolved oxygen, nitrogenous waste and phosphorus) measured at the farm scale; and (2) it must allow for the scaling and representation of these impacts within a hydrodynamic model that covers an entire watershed, including other users/ polluters of that watershed. The aim is to establish maximum lake-scale production levels that keep water quality and the condition of the benthic

community above acceptable levels in order to conserve natural ecosystems, as well as identifying potential interference among farms that may affect production.

Key elements that should be considered in a credible assimilative capacity study include:

- Catchment Area topology
- Hydrologic Control including: water inflow, water transport, bathymetry, hydrology, Meteorologic forcing, turbulence and diffusion, current and circulation regimes
- Inputs and amounts of all point and non-point sources of pollution from all aquaculture and non-aquaculture sites in an area
- Water quality parameters such as phosphorus, suspended solids, nitrogen, variability in temperature, and dissolved oxygen
- Farm characteristics such as feed type (composition and ratios), cage dimensions and numbers, cage spatial positioning and orientation, trout growing cycle including physiology (growth rates, feed assimilation, excretion, fish conversion factors). Harvest weight and density of individuals at maximum production levels, feed rate
- Sediment Measurements: Particle sedimentation rates: feed pellets and feces, accumulation of organic matter on the bottom, dissolved oxygen levels in water overlying the bottom. Benthic condition: presence-absence, abundance and/or diversity of benthic infauna.

 *FTAD SC requests feedback on additions to this list as well as suggestions on how to simplify the list of key elements to the key aspects*

## Appendix II-B: Formulas for Nitrogen and Phosphorus Remaining in the Environment

Both formulas are calculated over an entire production cycle at the farm. For the initial certification of a farm, the farmer must provide the calculation for the most recent batch of harvested fish. For subsequent certifications, the farmer must calculate it for all fish harvested during the previous 12 months.

### Total Nitrogen Remaining in the Environment

Formula:

(nitrogen in all feed used during production cycle - nitrogen removed responsibly from aquatic environment - (tonnes of fish produced \* nitrogen retention)) / tonnes of fish produced

Definitions:

*Nitrogen in feed:* The feed producer must provide the farmer the amount of nitrogen in the feed.

*Nitrogen removed responsibly from aquatic environment:* The amount of nitrogen that the farmer can demonstrate was removed from the water and disposed of in an environmentally manner.

- Sludge will be tested once a year for percent of nitrogen, which will be multiplied by volume of sludge removed in land based systems. Sludge must be re-tested for percentage of nitrogen any time feed composition of water pattern changes—including seasonal changes in flow.
- Sludge must be disposed of or reused in accordance with the best management practices described in Appendix XXX
- In the case of a biological lagoon or settling pond, it can be assumed that plants will uptake an average of 1,65 gram/pr m<sup>2</sup> pr. day, and this amount can be subtracted as if it were sludge<sup>63</sup>.
- For other systems used to remove nitrogen from the aquatic environment, the farmer must demonstrate the amount of nitrogen removed, as well as the proper disposal or reuse of any solid material

*Nitrogen retention:* The feed producer will provide the farmer the nitrogen retention percentage for a particular feed, as required under Principle 5.

*Tonnes of fish produced:* The weight of the harvested fish, minus the weight of fish when they were placed into the farm.

### Total Phosphorus Remaining in the Environment

Formula:

(phosphorus in all feed used during production cycle - phosphorus removed responsibly from aquatic environment - (tonnes of fish produced \* phosphorus retention)) / tonnes of fish produced

Definitions:

*Phosphorus in feed:* The feed producer must provide the farmer the amount of phosphorus in the feed.

*Phosphorus removed responsibly from aquatic environment:* The amount of phosphorus that the farmer can demonstrate was removed from the water and disposed of in an environmentally manner.

- Sludge will be tested once a year for percent of phosphorus, which will be multiplied by volume of sludge removed in land based systems. Sludge must be re-tested for percentage of

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<sup>63</sup> The nutrient uptake numbers are based on calculations by the Danish Environmental Protection Agency.

phosphorus any time feed composition or water pattern changes—including seasonal changes in flow.

- Sludge must be disposed of or reused in accordance with the best management practices described in Appendix II-D.
- In the case of a biological lagoon or settling pond, it can be assumed that plants will uptake an average of 0,2 gram/pr m2 pr day, and this amount can be subtracted as if it were sludge<sup>64</sup>.
- For other systems used to remove phosphorus from the aquatic environment, the farmer must demonstrate the amount of phosphorus removed, as well as the proper disposal or reuse of any solid material

*Phosphorus retention:* The feed producer will provide the farmer the phosphorus retention percentage for a particular feed, as required under Principle 5.

*Tonnes of fish produced:* The weight of the harvested fish, minus the weight of fish when they were placed into the farm.

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<sup>64</sup> The nutrient uptake numbers are based on calculations by the Danish Environmental Protection Agency.

**Appendix II-C: Receiving water monitoring for all systems**

Sampling Regime for Receiving Water Quality Monitoring (Standard 3.2.3). All water samples to be taken from a representative mixture of a 1-meter-depth column of water. All sampling locations will be identified with GPS coordinates on a schematic outline of the farm operations and on available satellite imagery. One sample must be taken within each of the three receiving water categories, but multiple sampling to understand receiving water dynamics is encouraged. Unless otherwise noted, samples will be taken monthly.

|   | Receiving Water—<br>Reference<br>point (RWRP#) <sup>2</sup> | Receiving Water—<br>Farm outfall or<br>mixing zone<br>(RWFO#) <sup>3</sup> | Receiving Water—<br>Farm afar<br>(RWFA#) <sup>4</sup> |
|---|---|--|---|
| Receiving Water System (Lake, River, etc.)                  | Specify   | Specify  | Specify   |
| Monthly Sampling Date/Time <sup>1</sup>                     | dd/mm/yyyy<br>hh:mm   | dd/mm/yyyy and<br>hh:mm  | dd/mm/yyyy and<br>hh:mm                               |
| Dissolved oxygen (mg/L)                                     |   |  |   |
| Total phosphorus concentration (ug/L)                       |   |  |   |
| pH  |   |  |   |
| Temperature   |   |  |   |
| Chlorophyll - <u>a</u>                                      |   |  |   |
| Total Ammonia Nitrogen                                      |   |  |   |
| Water flow in the receiving water (m <sup>3</sup> /min)     |   |  |   |
| Water flow on the farm site (m <sup>3</sup> /min)           |   |  |   |
| <i>The following two items must be assessed once a year</i> |   |  |   |

|   |  |  |  |
|---|--|--|--|
| Fauna index assessment in receiving water: Composition and abundance of benthic invertebrate fauna. |  |  |  |
| Cross-section area of river at RWRP and RWFA (needed to calculate water flow on monthly basis).     |  |  |  |

<sup>1</sup>In highly dynamic hydrologic systems, monthly sampling times will be alternated to represent events

<sup>2</sup>RWRP# is a reference or source point that ideally is not influenced by the farming operation, or is least influenced by the farm. Farms discharging in riverine systems, or cages positioned in riverine systems shall identify a point upstream of farm discharge or activity to serve as the reference point. Cage culture operations in lakes and reservoirs will identify a point in the receiving water that is at the maximum distance from the influence from the farming activities.

<sup>3</sup>RWFO# is a point where the farm culture water meets the receiving waters. Because the water inside a cage is a component of the receiving waters, cage operators will sample inside cages. In more point-source pollution oriented operations, this point will be in the mixing zone of farm effluent.

<sup>4</sup>RWFA# is a point where the farm effluent has an influence in the receiving waters but is not in the immediate outfall/mixing zone. This location would be downstream in a river, or down the prevailing current pattern in a lake, reservoir or estuary. # denotes the number of representative samples for a given category, should more than one sample be collected.

<sup>5</sup>In the case of cage culture in lakes or reservoirs, residence time and total water volume are required.



## Appendix II-D: Sludge BMP's for Land-based systems (RAS/ Re-circulation 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, bio-solids) from these processes is a critical element to responsible trout farm management. The FTAD acknowledges that BMP's 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 bio-solids capture, however this section deals with practices for cleaning, storage and disposal that will minimize the potential impacts of sludge/ bio-solids being released into the environment

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

- A process flow drawing that tracks/effectively maps the water and waste flow of a farm including treatment of waste, transfer of wastes, waste storage and final waste utilization options
- Farm shall have a management plan for sludge/ bio-solids 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, flooding, fire, drought . The management can be evaluated in relation to maintenance records

### System Design

- The design and installation of the waste water treatment system shall not allow direct access to the receiving waters, discharge points shall be above flood level in case of flood emergencies. The system design shall allow for simple cleaning routines of pipes, sumps, channels, units.
- Micro-screen filters for salmonid food and waste should be between 80 and 100 microns
- For farms established after the release of the FTAD standards, re-circulating tanks should be either circular or if rectilinear shall be designed so velocity is 15 cm/ s to ensure solids are rapidly moved along

### Operation

- Bio-solids from settler and micro-screen filter units that capture fish manure and waste feed as it exits tank shall be flushed at a reasonable frequency (generally several times per hour). Solids must be removed gently and rapidly as feed and fecal matter are both fragile and labile particles.
- Cleaning/ harvesting of bio-solids from OLS (Off Line Settling) shall occur monthly because the more often it is removed the more effective nutrient capture/ retention becomes.

### Disposal

- Solids shall be stored (long-term) in tanks, large impermeable plastic storage bags or earthen ponds. The design of such storage infrastructure should consider internal and external hydrostatic pressure, flotation and drainage, live and dead loads from equipment and bio-solids. Earthen ponds shall be lined with concrete, geo-membrane or clay based on site hydrology and geology, the design of the ponds should consider rainwater if they are uncovered and employ methods of agitation that ensure a uniform consistency of the solids.
- Dewatered biosolids must be either applied to fields at agronomic rates, composted, digested for methane, or land filled. Other options include reed drying beds, lagoons

## Appendix III: Biosecurity plan

Producers must demonstrate the applicability of their biosecurity plan to their farm system and location, and take into account current scientific and technical knowledge to ensure best practice. Plans must be subject to regular review<sup>65</sup> and improvement.

This checklist describes the minimum components necessary for a farm's biosecurity plan.

The farm owner must show that it

- sources fish, at all stages in the life cycle, from only a supply that is of equal or better health status than its own stock
- moves fish, at all stages in the life cycle, off site only to a location of equal or lesser health status
- controls access to the site and observes site hygiene and disinfection protocols
- is aware of applicable legislation and regulatory controls around biosecurity
- uses adequate diagnostic and detection methods for infectious diseases
- has disinfection and pathogen eradication methods
- designates a member of its staff who is responsible for biosecurity
- involves its designated fish health veterinarian in assisting with the development and maintenance of the plan
- ensures staff are trained in fish health management and disease recognition
- is able to identify the risks of contracting and spreading disease through fish movements on or off site and take preventative measures to mitigate risk
- identifies the risks of contracting and spreading disease as a result of on site procedures ( for example between different compartments on site) and take preventative measures to mitigate risk
- sets emergency procedures and addresses questions of what to do when

## Appendix IV: Veterinary health plan

Producers must demonstrate the applicability of their veterinary health plan to their farm system and location, and take into account current scientific and technical knowledge to ensure best practice. Plans must be subject to regular review<sup>66</sup> and improvement. The plan must be prepared by each fish farming company in collaboration with their designated veterinarian.

This checklist describes the minimum components of the farm's veterinary health plan. The farm must show it

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<sup>65</sup> Annually, at a minimum, or whenever there are managerial, procedural, operational or physical changes

<sup>66</sup> Annually, at a minimum, or whenever there are managerial, procedural, operational or physical changes

- has staff responsible for implementing the plan
- maintains a farm history and treatment history (including endemic diseases)
- maintains a treatment plan and treatment book, which are described in more detail below
- maintains details of frequency and procedures for grading
- uses a mortality monitoring and recording system that provides an effective framework for identifying disease problems which can facilitate appropriate changes to management practices
- immediately investigates mortality events on site and, in instances where mortality remains unexplained or unattributed, further investigates such events with fish health professionals off site
- has a policy for the use of anesthetics
- has implemented a regionally appropriate vaccination program designed and overseen by its designated veterinarian, using vaccines that are effective and commercially viable
- reviews the number of treatments used during each production cycle and, based on the recommendation of its veterinarian, adjusts the intensity of treatments

### **Treatment book**

The treatment book must include up to date:

- evidence that all treatments are prescribed by the designated veterinarian, as well as records of all treatment strategies and recommendations
- records of veterinary medicines treatments, including veterinarian prescription(s)
- records of the traditional remedies or water treatments used
- treatment efficacy assessment records
- reconcilable drug inventories tracking intake and usage
  - intake records that include the name of medicine, date and quantity purchased, quantity delivered, number of days the medicine is used, batch number supplier and manufacturer (if different than supplier)
  - Usage records that include the identity of the group of fish treated, date and time treatment started, date and time treatment finished, feed name and quantity, dosage rate and batch number of controlled product, length of withdrawal period (including average water temperature used to calculate the withdrawal period), earliest date for harvesting the fish for human consumption, and the name of the person responsible for treatment and on-farm mixing

## Appendix V: 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 standard, it is the highest number (i.e., dependency) that is relevant and which must be used. This formula calculates the dependency of a single site on wild forage fish resources, independent of any other farm.

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

$$FFDR_o = \frac{(\% \text{Fish oil in feed from forage fisheries}) \times (\text{eFCR})}{5.0}$$

Notes:

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

$$eFCR = \frac{\text{Feed, kg or mt}}{\text{Net aquacultural production, kg or mt (wet weight)}}$$

- The percentage of fishmeal and fish oil excludes fishmeal and fish oil derived from fisheries byproducts.<sup>67</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 byproducts (e.g., trimmings and offal) should not be included because the FFDR is intended to be a calculation of direct dependency on wild fisheries.
- The amount of fishmeal in the diet is calculated back to live fish weight by using a yield of 22.2%. 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%. This is an assumed average yield. If a different yield is used, documentation must be provided.

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<sup>67</sup> Trimmings are defined as by-products when fish are processed for human consumption or if whole fish is rejected for use of human consumption because the quality at the time of landing do 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 do not come from any species that are classified as critically endangered, endangered or vulnerable on the IUCN Red List of Threatened Species (<http://www.iucnredlist.org/static/introduction>).

## 2. IFFO

The International Fishmeal and Fish Oil organization (IFFO) has developed a certification scheme for responsibly sourced fishmeal and fish oil. This certification scheme is ISO 65 compliant. To comply with the IFFO's definitions of "responsible sourcing" and "responsible production," the producer must be able to demonstrate

### Responsible sourcing

- Whole fish used must come from fisheries that have been independently and scientifically assessed and meet the key principles of the United Nations Food and Agriculture Organization (UN FAO) Code of Conduct for Responsible Fisheries, which is the only internationally recognized measure of good fisheries management.
- Assessors will be looking for science-based requirements to protect stocks, habitats and the wider environment, such as stock assessments; precautionary approach with formal reference points; management of the fleet capacity; fishing gear controlled to reduce catches of juveniles, by-catch and environmental damage; closed seasons, closed areas and restricted fishing; and sufficient inspection, observation, detection and recording systems to ensure a high level of compliance.
- Illegal, unreported and unregulated fish are excluded.

### Responsible production

- The factory must have attained certification to the International Feed Ingredients Standard of the International Feed Safety Alliance or equivalent, as proof of responsible manufacturing.
- The farmer must be in possession of all relevant permits and licenses for the production and sale of fishmeal and fish oil products.
- The factory must have the ability to identify the source of all raw material and to segregate material from compliant and non-compliant fisheries thereby ensuring that only compliant raw material is used in the production of IFFO certified fishmeal and fish oil.

For full details of the standard, go to [www.iffonet.net](http://www.iffonet.net) and click on Global Standard for Responsible Supply in the main menu. This document will appear alongside the standard and both will be updated to reflect the ongoing development of the RS program.

## **3. Explanation of FishSource Scoring**

- FishSource (FS) scores capture some, but not all, aspects from the fisheries through the lenses of the Marine Stewardship Council (MSC). The majority of those aspects can be measured quantitatively. Other important features of sustainability are addressed elsewhere on FS (i.e., on each of the 12 sections that make a fishery profile).
- The key relationship between the MSC scoring system and FS scores is 80<->8 (i.e., an FS score of 8 or above would mean an unconditioned passing at that particular aspect on the MSC system. The Sustainable Fisheries Partnership, which create FS, devised scores in a way that, departing from 8, a score of 6 relates to a score of 60, and below 6, relates to an MSC "below 60", "no-pass" condition.

Please note, however, that the MSC criteria have been interpreted through time with a substantial degree of variability among fisheries and, unfortunately, this uncertainty might propagate to Fishsource scores on specific cases.

- The MSC system states that “if any PI [lower level criterion – roughly at the FS scores’ level] fails to reach 60 the *fishery will be ineligible for certification.*” Thus, this might be used as an analogy for FS scores below 6.
- Whenever an FS score is “na”, which denotes the unavailability of information, it should be determined whether this is because of official non disclosure of the information. FS staff will work to overcome the data gap and provide a numerical score.