

FRESHWATER TROUT AQUACULTURE DIALOGUE

Draft standards for environmentally and socially responsible trout farming

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

BioMar

British Trout Association

(representing the Federation of European Aquaculture Producers)

FishWise

Liman

North Sea Foundation

Società Agricola Trocoltura F.lli Leonardi s.s.

Università dell'Insubria

World Wildlife Fund

This document contains revised draft standards for environmentally and socially responsible freshwater trout farming. The standards have been revised from the first draft standards (released in July 2010) based on public feedback and the deliberations of the Freshwater Trout Aquaculture Dialogue Steering Committee.

This revised draft does not represent final agreement by the Steering Committee and is a working draft that will benefit from further public input. On any given standard, individual Steering Committee members may have a range of views. As a package, the Steering Committee believes the standards represent an important step forward in defining environmentally and socially responsible production of freshwater trout.

The standards are open for public comment from 18 May 2011 through 18 June 2011. Comments can be submitted via the website at www.worldwildlife.org/troutdialogue. Feedback received during the public comment period will be posted online. The Steering Committee will use this public input to inform its decisions when it develops final standards within the next few months.

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.....	19
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.....	30
PRINCIPLE 6: BE SOCIALLY RESPONSIBLE.....	37
SECTION 7: STANDARDS FOR FINGERLING AND EGG SUPPLIERS.....	47
Appendix I: Assessment data needed to comply with FTAD standards	51
Appendix II: Methodologies related to Principle 3 – Water Resources	53
Appendix III: Feed resource calculations and methodologies.....	57

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 share of global seafood 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 – 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. The vast majority of freshwater trout consumed today is farmed. The FTAD standards are intended to be rigorous, so as to eliminate or minimize any potential adverse environmental and social impacts. They are also expected to be achievable by today’s top performers, in order to create a noticeable presence in the marketplace and a catalyst for improved performance across the global industry.

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, which will be responsible for working with independent, third party entities to certify farms that are in compliance with the standards.

Initiated 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 producers, feed manufacturers, environmental NGOs, and researchers. Steering Committee members have generously donated their time to this initiative. A philanthropic foundation provided funding to cover travel expenses for SC members from non-profit

organizations and academia to attend in-person SC meetings. Other SC members covered their own expenses.

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.

This revised draft standards document has been posted for a 30-day comment period ending on 18 June 2011. The Steering Committee is eager for feedback from a broad range of stakeholder groups, including producers, NGOs, and retailers. The Steering Committee will publish online all public comments received during this period and use the input to inform its decisions when developing the final standards within the next several months.

The FTAD will assist in the implementation of the standards through a Technical Advisory Group of the Aquaculture Stewardship Council (ASC). Two members of the FTAD Steering Committee will participate in the Technical Advisory Group, which will help ASC to use the standards in a way the dialogue intended, guide processes to harmonize standards across different species and revise standards periodically. ASC, rather than the FTAD Steering Committee, will be responsible for implementation of the standards.

This document does not reflect final agreement by the FTAD SC. The revised draft standards outlined below are a set of ideas put forward for public discussion. On any given standard, individual Steering Committee members may have a range of views. As a package, the Steering Committee believes the standards represent an important step forward in defining environmentally and socially responsible production of freshwater trout. Where needed, the SC will continue to debate outstanding issues and develop alternatives based on public input, proactive outreach and further research.

For complete information about the FTAD, including meeting summaries and presentations, go to 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 any negative impacts 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.

The FTAD standards are designed so that a farm must achieve 100% compliance on each and every standard in order for certification to be awarded.

The standards focus on the environmental and social impacts of trout farming. 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.

Species to which the standards apply

These standards were developed considering farming systems for rainbow trout (*Oncorhynchus mykiss*). However, they are applicable for any salmonid grown in fresh water. A future review of these standards will consider whether specific requirements should to be adapted for different species.

Systems to which the standards apply

The standards 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. In some cases, the standards use different metrics to determine the environmental performance of different systems. For instance, the effluent standards are divided between land-based systems and cage systems. Production systems that typically have greater environmental or social impacts will have more rigorous standards in order to achieve full compliance.

Unit of certification to which the standards apply

The unit of certification for the FTAD standards is the site-specific 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 the environment.

These standards will be audited at the “grow-out” phase of trout farming, defined as production facilities for fish weighing more than 10 grams. The standards also include a set of requirements around the fingerling and egg suppliers. A farm seeking certification would need to demonstrate through

documentation that its fingerling and/or egg suppliers have met those requirements. Requirements are also made around a farm’s feed inputs.

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 Denmark 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
Jose Villalon	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

Margreet van Vilsteren	North Sea Foundation	Environmental NGO	Netherlands
Matteo Leonardi	Società Agricola Trotilcoltura F.lli Leonardi s.s.	Producer	Italy

- The FTAD has also benefitted from the inputs of former SC members Merrielle Macleod of WWF, Dawn Purchase of the Marine Conservation Society, Luz Arrequi of Tres Mares and Rene Benguerel of Blue You Consultancy.
- 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:

Date	Location	Target Audience
April 2009	Denmark	Producers, government aquaculture researchers, feed producers and consultants
June 2009	Spain	Producers, government researchers, consultants and environmental/social NGOs
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 a public comment period from July 27, 2010 through September 27, 2010.

- A Dialogue Meeting was held in Verona Italy during the public comment period. A meeting summary from Verona, as well as all comments submitted during the public comment period, were posted online and used by the Steering Committee to revised the draft standards. The SC met for 3 days in January 2011 and conducted more than a dozen conference calls over the past six months to revise the draft standards.
- The SC expects to produce final standards within a few months of the close of the current public comment period.
- 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. ASC's web site is: <http://www.ascworldwide.org/>. Two members of the FTAD SC form part of a Technical Advisory Group of the ASC that will assist in implementing the standards in a way that is consistent with the intent of the FTAD.
- 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 led to believe that the standards will be revised approximately every three to five 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.

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

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

Rationale

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

These 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. The areas specifically addressed above were considered to be the key areas within local and national regulations frameworks and legislation.

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

Auditing Guidance

- 1.1.1 This standard seeks to ensure a farm is allowed by authorities to undertake aquaculture activities in that location. Documents that might serve to demonstrate this include: permits, evidence of lease, concessions and rights to land and/or water use.
- 1.1.2 This standard seeks to ensure a farm is complying with its tax obligations. Documents that might serve to demonstrate this include: documentation provided from annual accounting and correspondence with tax authorities.
- 1.1.3 This standard seeks to ensure the farm is complying with relevant labor laws: Documents that might serve to demonstrate this include: employment contracts and correspondence with relevant government authorities.
- 1.1.4 This standard seeks to ensure a farm is complying with the water quality parameters established by its regulators. Documents that might serve to demonstrate this include: effluent analyses, correspondence with regulations.

In the case of legal disputes that are under appeal—producers are assumed to be innocent until proven guilty.

The FTAD SC recognizes challenges related to documentation of applicable legal compliance. Knowledge of necessary documentation required by the auditor must be made available to producers in advance of the audit.

Additional information for review of Principle 1

- 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 international 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.

PRINCIPLE 2: CONSERVE HABITAT AND BIODIVERSITY¹

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

The 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.

Criterion 2.1 Siting and location of farms²

INDICATOR	STANDARD
2.1.1. Allowance for siting in National Protected Areas ³	None ^{4,5}
2.1.2 Conversion of wetlands ⁶ after 1999.	None ⁷
2.1.3 An assessment of the presence on the farm of species listed on the International Union for Conservation of Nature (IUCN) "Red List of Threatened Species" as vulnerable, near	Yes

¹ 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.

² To determine its compliance with the standards in 2.1, a producer will need documentation 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.

³ 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.

⁴ An exception is made for protected areas that are classified by the International Union for Conservation of Nature (IUCN), as Category V or VI. These are areas preserved primarily for their landscapes, or areas that include sustainable resource management. Details can be found here: http://www.iucn.org/about/work/programmes/pa/pa_products/wcpa_categories/

⁵ An exception is also made for farms located in protected areas that are designated as such after the farm already was established in that location. In these situations, the farm must demonstrate that its operation is compatible with the objectives of the protected area, and that it is in compliance with any relevant conditions placed on the farm by authorities as a result of the protected designation.

⁶ **Wetland:** Generally, wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. Wetlands generally include swamps, marshes, bogs and fens (U.S. Environmental Protection Agency).

⁷ **Exception:** Conversion of wetlands for access to surface water (e.g., canals for inlets and outlets): Converted surface area must be offset by restoration of 100% of the equivalent area of functional wetlands with the same habitat characteristics on the farming operator's area.

threatened, endangered or critically endangered; an evaluation of the farm’s impact on any such species present; and clearly defined mitigation measures to reduce any negative impacts and allow existence of such species	
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Rationale

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

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

The IUCN’s “Red List of Threatened Species” is a global inventory of the conservation status of plant and animal species. A series of “Regional Red Lists,” which are produced by countries or organizations, assess the risk of extinction of species within a given political jurisdiction. The Red Lists use criteria that evaluate extinction risk. The 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 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. Wetlands should be restored and rehabilitated, whenever possible, and conserved by ensuring 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” (also known as the Ramsar Convention) was approved. The convention provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

Additional information for review of second draft

In this revised draft, the FTAD Steering Committee has taken a step back from requiring third-party documentation around farm siting impacts. The SC believes that there are resources and relatively simple tools that producers and certifiers can use to determine compliance with these standards.

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 effectively and credibly incorporate HCVA methods into this version of the standards, because these methodologies are still under development for freshwater ecosystems.

Criterion 2.2 Riparian buffer zones⁸

INDICATOR	STANDARD
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⁸ A riparian buffer zone is the land immediately abutting a water body.

2.2.1 For farms installed after publication of the FTAD standards (or for significant expansions ⁹), evidence that regulatory filings and/or planning applications have addressed potential impacts on the riparian buffer zone and committed the farm to mitigation measures for identified impacts	Yes
2.2.2 For farms installed on land after publication of the FTAD standards (or for significant expansions), minimum riparian buffer zone width in which there is no farm infrastructure that might impede wildlife's access to the water, except for inflow and outflow systems.	≥ 10 meters from the water's edge
2.2.3 For existing farms, documented evidence of an assessment 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 mitigation measures as recommended by that assessment and within the recommended timeline.

Additional information for review of second draft

Riparian buffer strips are an important means for conserving local biodiversity. Defining the ideal riparian buffer strip is challenging (Fischer and Fischernitch, 2000¹⁰). 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 Lees and Peres (2008) 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 difficult.

⁹ For the standards under Criterion 2.2, significant expansions are defined as those that increase by more than a third a farm's production infrastructure that might impact the riparian zone.

¹⁰ 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

Many trout farms have difficulty establishing even modest buffer zones because of the nature of their licenses, the need to be in close proximity to a river, compact farm site, or even the natural geography of the site. In addition, farms may not own the riparian buffer land, or be able to exercise effective control of it.

Criterion 2.3 Introduction of exotic species¹¹

INDICATOR	STANDARD
2.3.1 New introductions of exotic trout after the date of publication of the standards, unless approved for aquaculture in the jurisdiction by a process based on the International Council for the Exploration of the Seas (ICES) ¹²	None

Rationale

Accidental or intentional introductions of non-native species can cause significant global environmental problems with potentially far-reaching social and economic impacts as well.¹³

Aquaculture is considered to be one of the major pathways for introducing non-native aquatic plants and animals that could become invasive and result in biodiversity loss.¹⁴ Rainbow trout, in particular, is one of the most widely introduced fish species in the world.¹⁵ 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 this 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 effects¹⁶ on native trout populations, disease transmission,¹⁷ predation¹⁷ and competition with native species.¹⁸

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

¹² <http://www.ices.dk/reports/general/2004/icescop2004.pdf>

¹³ 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.

¹⁴ 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). 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.

¹⁵ Global Invasive Species Database www.issg.org

¹⁶ 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). (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).

¹⁷ 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

The ICES “Code of Practice on the Introduction and Transfer of Marine Organisms” is one of the most comprehensive instruments to assist in the responsible use of introduced species in marine and fresh waters. If an operation (after the publication of the FTAD standards) wishes to cultivate a trout species that is not already native or established in a region, it must undertake a rigorous assessment in accordance with the guidelines outlined in the ICES code. The introduction of new, exotic and non-indigenous species must also be in compliance with national law, as specified in Principle 1.

Criterion 2.4 Transgenic¹⁹ 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 trout is prohibited under the FTAD standards. Invoking the precautionary principle, the FTAD cannot allow for these species to be cultured until there is more conclusive evidence that demonstrates that they pose an acceptable level of risk to adjacent ecosystems.

The culture of genetically enhanced²⁰ 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.

Criterion 2.5 Escapes from culture facilities

INDICATOR	STANDARD
2.5.1 Evidence of a well-designed, maintained and managed culture system, infrastructure and farm management to prevent escapes during grow-out	

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).

¹⁸ In New Zealand it is suspected that rainbow trout affect native fish species through direct predation and competition for feeding areas (McDowall, 1990).

¹⁹ 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.

²⁰ 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

and at harvest, as demonstrated through the following:	
a. Effective screens or barriers of appropriate mesh size for the smallest trout present	Yes
b. Records for all movement of trout on the farm, number of fish being kept on the farm, known escapes and unexplained loss of fish	Yes
c. For open net pen systems: Evidence of 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. For open net pen systems: Presence of a protocol for regular net inspections that includes: daily visual inspections (weather and safety conditions permitting); weekly inspection of the top section of nets; full inspection (lifted out of the water) prior to any procedure such as crowding of fish or grading; annual testing, in accordance with a detailed test procedure based on manufacturer's advice and using a documented quality control system; inspections with divers in situations where fish are reported to have escaped, or after specific incidents such as vandalism, predator attack, extreme weather.	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 aspect of farm operation, identify the risks involved and define mitigation procedures for prevention of escapes	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 SOP	Yes
2.5.4 Minimum of number times that all fish in net pens are counted and recorded	≥ 4 times per year

Rationale

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

Auditing Guidance

To comply with record-keeping required in 2.5.1 and to calculate unexplained loss, a farm would need to account for all fingerlings placed in the farm (invoice and counting), outputs from any counting that is conducted, mortalities and known escapes, and the output of harvested trout.

Criterion 2.6 Predator control

INDICATOR	STANDARD
2.6.1 Use of lethal predator control	None (exception in footnote) ²¹
2.6.2. Mortality of IUCN red listed species due to interaction with the farm ²²	0

Rationale

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

The intentional killing of animals that prey on cultured trout is inappropriate for farms certified under these 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 an assessment that demonstrates lethal action against a particular predator is appropriate, necessary and presents no risks to wild populations or ecosystems.

This exception cannot be applied to species that are threatened, endangered or critically endangered. Such species must also not be killed by passive means, such as entanglement in nets or other infrastructure on trout farms.

²¹ The standard permits an exception to the prohibition on lethal action in situations where the farm can provide evidence of an assessment that demonstrates lethal action against a particular predator is appropriate, necessary, and presents no risks to wild populations or ecosystems. This exception cannot be applied to species that are threatened, endangered or critically endangered. The assessment must come from an EIA or any other credible process of environmental analysis.

²² Interaction includes entanglement in nets and other farm infrastructure

PRINCIPLE 3: MINIMIZE NEGATIVE EFFECT ON WATER RESOURCES

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

Criterion 3.1 Water Use / Abstraction Levels

INDICATOR	STANDARD
<p><i>Only applicable to farms utilizing surface water:</i></p> <p>3.1.1 Evidence that the volume and flow of water entering the farm from the natural environment has been determined and permitted through an environmental regulatory process that safeguards the ecosystem function of the water body (river, stream etc.).²³ If no regulatory processes exist, farms will be tasked with verifying that the water diverted will not impair the near-farm or downstream water body.</p>	<p>Yes</p>
<p><i>Only applicable to farms utilizing ground water:</i></p> <p>3.1.2 Evidence that the amount of water abstracted was determined and permitted through an environmental regulatory process designed to ensure no net annual depletion of the underground water sources. If no regulatory processes exist, farms will be tasked with verifying that the water abstracted does not cause a net annual reduction in groundwater water level.</p>	<p>Yes</p>

Rationale

Trout aquaculture facilities utilizing flowing water (including re-circulating systems) require a constant supply of freshwater. Farms removing or diverting freshwater resources require appropriate and effective management to oversee water allocations and ensure efficient utilization. Trout farms typically make use of groundwater (wells) or surface waters (rivers or streams) as their water source. When using

²³ The FTAD Steering Committee is still determining how to provide clear auditing guidance around this standard and standard 3.1.2.

surface water, it is critical to understand the capacity of the water body to effectively adjust to the water diversion, even if only for a short distance. The intent of the diversion standard is to lessen the probability that a farm’s water diversions reduce flow or stream/river discharge to the point where natural flora and fauna are negatively affected or stressed.

Conversely, groundwater requires attention because it is the abstraction and displacement of typically higher quality water. Well or aquifer recharge is the process of water being replenished in the ground. When abstraction increases beyond the rate of recharge, the result is a net reduction in the water table. Thus, the intent of the groundwater standard is to ensure that careful consideration has been given to the amount of water abstracted and displaced from the ground and the specific recharge of that groundwater system. Further, maintaining a net positive recharge will reduce the likelihood of resource conflicts with other users and help maintain a more consistent farming operation.

The standards under Principle 1 will ensure that a farm is respecting the abstraction limits set by its regulator.

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

Additional Information for review of this draft

The FTAD Steering Committee would welcome public input on how to make Standards 3.1.1 and 3.1.2 more precise and auditable. In particular, the SC seeks suggestions on how to best define an “environmental regulatory process that safeguards the ecosystem function” and an “environmental regulatory process designed to ensure no depletion of the underground water source.”

Criterion 3.2 Land-based systems - Water Quality / Effluent

INDICATOR	STANDARD
3.2.1 Farm water quality monitoring matrix completed (see Appendix II-A) at intake and discharge points.	Yes
3.2.2 Maximum total amount of phosphorus released into the environment per metric ton (mt) of fish produced over a 12-month period. (see methodology in Auditing Guidance section below)	6.5 kg/mt of fish produced over a 12-month period; within 3 years of publication of the FTAD standards, 5 kg/mt of fish produced over a 12-

	month period
3.2.3 Minimum oxygen saturation in the outflow (methodology in Appendix II-A)	70% ²⁴
3.2.4 Allowance for differences in benthic macroinvertebrate survey results 100 m from farm's last discharge point, and 25 m upstream of the farm intake point, conducted at least once every three years	No statistically significant change in survey results between the two locations
3.2.5 Evidence of implementation of biosolids (sludge) Best Management Practices (BMPs) (see Appendix II-B)	Yes

Rationale

When bodies of water are used directly for trout aquaculture, or to receive water discharge from farms, it is important to understand the farm's effect on the environment.

Regular monitoring of discharges is the first step in ensuring a farm is aware of and minimizing potential impacts on receiving waters. Phosphorus is the key limiting nutrient in temperate and cool freshwater systems. It is a stable nutrient in that it does not volatilize like nitrogen compounds. It is also added to feeds in proportions that can allow estimations of other waste constituents (organic matter and nitrogen). Thus, phosphorus is an ideal variable to set load limits for freshwater trout aquaculture.

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

As nutrients are added to a water body, primary productivity increases. This increase causes more oxygen to be released into the water body as a byproduct of photosynthesis during daylight hours. Concurrently, during the day, oxygen is consumed by primary producers and other aquatic life forms as they respire. In the absence of light, however, photosynthesis ceases but respiration continues. Thus, during the night, oxygen is consumed, resulting in a decrease in dissolved oxygen. In an attempt to limit the oxygen burden on natural water bodies, these standards include a minimum saturation level of dissolved oxygen at discharge.

²⁴ A single oxygen reading below 70% would require daily continuous monitoring with an electronic probe and recorder for at least a week demonstrating a minimum 70% saturation at all times.

Benthic biodiversity is often a measure of aquatic ecosystem health. In regards to trout farms, the benthic biodiversity both above and below the farm can be assessed to determine the relative abundance of species. A statistical comparison can be utilized to determine the farm's effect on the downstream benthos.

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

Additional information for review of this draft

The FTAD recognizes that different trout-growing jurisdictions employ a variety of regulations around water quality. Some regulations will resemble these draft FTAD standards, while other jurisdictions use different approaches. These draft standards represent the FTAD's effort to write standards that will function globally with a range of receiving waters. The FTAD SC welcomes public comments about how to preserve the intent of these standards while minimizing the costs for farms that need to demonstrate water quality performance with different metrics and monitoring schemes.

The monitoring scheme required under this draft standard seeks to provide farmers with the essential information needed to gauge their impact on receiving waters. The frequency of measurements and proposed methodology reflects an effort to maximize the usefulness of the information, while attempting to reduce the cost of testing. The frequency also reflects the additional testing required in Principle 4 that ensures a healthy aquatic environment for fish inside the farm.

The FTAD SC is contemplating ways to reduce the frequency of monitoring for farms that consistently demonstrate readings that meet the standard.

The SC extensively debated the standard around total phosphorus per ton of production (3.2.3). The SC sought to set the standard at a level that recognized and encouraged better performance, while being cautious about unintended negative consequences around fish health that might occur by providing incentives to dramatically reduce phosphorus content in feed.

The SC is still considering whether the standard of 6.5 kg/mt of fish produced achieves these stated goals. SC deliberations have been informed by research papers and other data that provides a rough snapshot of the range of farms' performance today, which varies significantly. The SC wants to support improved performance around this indicator, and believes that advances in feed will help farmers drive down phosphorus emissions in the coming years while preserving fish health.

The SC encourages all stakeholders to provide input on how to further refine these water quality standards, as well as actual data around farms' performance today.

Auditing Guidance

Nutrients such as phosphorus and nitrogen must be sampled using a 24-hour water bulk method. Unstable parameters such as TSS, BOD, ammonia, and nitrite, must be sampled in the early afternoon, when fish are typically digesting food and concentrations will likely be relatively higher than at other times in the day.

Standard 3.2.2 seeks to promote farm efficiency in managing feed resources and managing nutrient releases. To do this, a monthly 24-hour water bulk sample will be collected in the intake and outlet of the farm and analyzed for total phosphorus concentration (g/m³). Total water volume discharged during this period will be quantified. Intake water flow will also be determined. The difference in phosphorus concentration between the inlet and outlet, multiplied by the water flow, will provide the total phosphorus released from the farm over a 24-h period.

The twelve monthly samples will be averaged and multiplied by 365 days to calculate annual net discharge. In order to correctly relate this data with the whole trout production biomass, accurate recording of fish biomass produced during those 12 months must be provided, including detailed records of any fish transfers.

The formula for calculating kilograms of total phosphorus per ton of production (per standard 3.2.2) is as follows:

$$\text{kg P/mt fish}_{12 \text{ months}} = \frac{\text{Water discharge (m}^3/\text{day)} \times 365 \text{ (days/yr)} \times \Delta\text{TP (g/m}^3) \times 10^{-3} \text{ (kg/g)}}{(\text{CSS (mt)} + \text{TH(mt)} - \text{ISS (mt)}) - \text{SF from offsite(mt)}}$$

Where:

Q = Water discharge

ΔTP = Total phosphorus (Net of outlet minus inlet)

CSS = Current standing stock

TH = Trout harvested

ISS = Initial standing stock

SF = Stocked fish (additional fish stocked during the 12 months)

NOTE: standing stock, trout harvested, initial standing stock and fingerlings stocked are for the prior 12-month period.

Criterion 3.3 Cage Based Systems – Water Quality / Benthic Community:

INDICATOR	STANDARD
3.3.1 Assimilative capacity study conducted based on users and their inputs into the water body undertaken for all farms and farm expansions in lake and reservoir systems (see Appendix II-C).	Yes

3.3.2 Minimum percent oxygen saturation of water 1 meter above bottom sediment, measured monthly at 50-m from the center line of the cage(s) and at suitable reference stations located within 1 – 2 km of the site (see Appendix II-D)	≥ 50%.
3.3.3 Maximum mean total phosphorus (TP) concentration, based on samples collected monthly at 50, 1,000 and 2,000 m from the cages.	≤ 1.5 times the morphoedaphic index (or equivalent as calculated in the assimilative capacity study)
3.3.4 Difference between mean monthly TP concentration at 50 m from center line of cages versus TP at reference sites	No statistically significant difference
3.3.5 Assessment of benthic macroinvertebrate community 50 meters from the center line of cage(s) and at reference stations (see Appendix II-C)	Assessments at least every three years

Rationale

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

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

These standards require that cage farming only be permitted once a comprehensive assimilative capacity assessment of the water body has been conducted. The study will determine if cage farming is appropriate in the water body and will set a limit on production and/or nutrient discharge based on the

water body's assimilative capacity. Detailed requirements of this study are provided in an Appendix IIC and reflect global best practice.

Where sufficient capacity has been determined in a lake or reservoir system, water quality monitoring would be required to ensure that the operation of the cage based fish farm is not resulting in an increase in nutrient levels near the farm or throughout the water body. Total phosphorus samples would be collected on a monthly basis from stations located approximately 50 m from the cage center line in all directions, and at reference stations located approximately 1-2 kilometers (km). Samples will be collected as composite samples of the water column to a depth equal to the depth of the cages. Samples will be submitted to an accredited laboratory for analysis of TP to a method detection limit of ≤ 0.002 mg/L. Annual results will be summarized and median values for the near cage stations will be compared to median reference site results. The standards require that total phosphorus levels remain statistically the same near the farm and at reference sites, and never climb higher than 1.5 times the lake's morphoedaphic index, ensuring the entire water body isn't being transformed.

Dissolved oxygen monitoring would be completed at the stations located 50 m from the center line of the cages and at the reference stations. Low dissolved oxygen levels can be a sign of excessive nutrient loading in the water column. On the lake bottom, decreases in oxygen levels are an indication of the degradation of organic wastes from the cages. DO levels in the bottom waters should be maintained above 50% saturation.

The objective of the benthic macroinvertebrate survey is to determine if the cage discharge has had an impact through the evaluation of the communities at the edge of the management zone and similar reference sites. The standard allows farms to choose between faunal indexes, such as the Shannon index, the Simpson index; and Pielou's evenness index.

Additional guidance for review of this draft

The SC is considering whether to give a farm a period of time (perhaps 3 years) to complete an assimilative capacity study, if the farm is currently operating with an environmental permit but has never done the type of study outlined in Appendix II-C. In addition, the SC is still weighing the detailed requirements outlined in Appendix II-C.

The SC is considering a different version of the dissolved oxygen standard (3.3.2) in which a reading below 50% saturation would trigger additional analysis. For example, a farm would need to analyze the concentration of total organic carbon on the bottom and monitor its benthonic "map" as compared to existing literature. Expert analysis of this data could show the farm's compatibility with the specific lake environment. Also, the farm would undertake a biologic index in the water column as compared to a reference site. A specialist would evaluate the need to undertake a benthonic fauna index as well.

The SC is also considering adding a requirement to measure water quality with a Secchi Disk.

In addition, the SC is debating changes to 3.3.4 (total phosphorus concentrations 50 meters from the cages) or its removal. The SC welcomes feedback on how to set a standard that would minimize or eliminate localized increases in phosphorus concentration do to cage farming.

PRINCIPLE 4: PROACTIVELY MAINTAIN THE HEALTH AND WELFARE²⁵ OF CULTURED FISH AND MINIMIZE THE RISK OF DISEASE TRANSMISSION

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

Criterion 4.1 Farm Health management

INDICATOR	STANDARD
4.1.1 Presence of a site-specific farm health plan that is reviewed at least annually and addresses biosecurity, veterinary health, crisis management and risk assessment	Yes
4.1.2 All fish, at all stages in the life cycle, are sourced from a supply that is of equal or better health status than its own stock	Yes
4.1.3 All fish that are moved off site, at all stages in the life cycle, are moved to a location of equal or lesser health status	Yes
4.1.4 Site access, disinfection and hygiene protocols are written and observed	Yes
4.1.5 Biosecure disposal of mortalities and fish trimmings	Yes
4.1.6 Presence of a treatment plan, treatment record book and farm health history that includes a detailed recording of all treatments and all health events on the farm	Yes
4.1.7 Immediate investigation of all mortality events on site and, in instances where mortality remains unexplained or unattributed, further investigation with fish health professionals off site	Yes
4.1.8 Minimum frequency of inspection of the farm by a	≥ 1 inspection per year, at a time

²⁵ "Welfare" is defined here as functional welfare, meaning fish are raised under environmental conditions that promote healthy growth and development incurring minimal stress.

designated veterinarian ²⁶ who specializes in aquatic animal health. The inspection must review the farm health plan.	when the site is in production
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Rationale–

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

Criterion 4.2 Chemicals and treatments

INDICATOR	STANDARD
4.2.1 Use of therapeutic treatments, including antibiotics or other treatments, that are banned under European Union (EU) law	Not permitted
4.2.2 Prophylactic use of chemical antimicrobial treatments (excluding prebiotics and probiotics that have been approved by a regulatory process that included a risk assessment) ²⁷	Not permitted
4.2.3 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

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. Since there is no single global list of banned treatments, these standards have adopted EU regulation as a source for a list of banned treatments because of the significant experience of EU regulatory agencies.

Prophylactic use of antimicrobial treatments may lead to excessive or unnecessary treatments, increasing the risks of the development of antibiotic resistant bacterial strains. Vaccination reduces the necessity for therapeutic treatments, thereby reducing potential impacts.

²⁶ A designated veterinarian is the professional responsible for health management on the farm who has the legal authority to diagnose disease and prescribe medication. He/She is expected to have a degree in Veterinarian Medicine and a strong background in fish disease control.

²⁷The washing of eggs is permitted under this standard.

Criterion 4.3 Environmental welfare

INDICATOR	STANDARD
4.3.1 Minimum O ₂ saturation levels monitored daily, using an oxygen meter ²⁸	Average reading of daily measurements over one month must equal or exceed 70% saturation, with no more than 5% of individual readings below 50% saturation
4.3.2 Maximum NO ₂ -N levels monitored weekly in re-circulating systems, monthly in flow through systems, and twice a year at cage sites	≤ 0.1 mg/l NO ₂ -N ²⁹
4.3.3 Maximum NH ₃ -N levels monitored weekly in re-circulating systems, twice a year in flow-through systems and once a year at cage sites.	≤ 0.07 mg/l NH ₃ -N ³⁰
4.3.4 Presence of detailed records of the numbers and weights of fish in tanks, ponds or cages and of movements between them	Yes
4.3.5 Evidence that maximum stock density was determined jointly by the designated veterinarian and site management	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 availability of oxygen in rearing water is the most important water quality parameter in aquaculture.³¹ A number of studies on different species of fish have indicated that growth is reduced under hypoxic conditions.

The oxygen standard used in this document is expressed as oxygen saturation, or partial pressure of oxygen, since the diffusion of oxygen from the water across the gill epithelia and into the blood is driven by the partial pressure gradient of oxygen.³²

²⁸ Monitoring of water quality should be consistent (i.e., samples taken at evenly spaced intervals appropriate to providing sufficient and meaningful data).

²⁹ If one reading exceeds the level, daily monitoring must be performed for 10 successive days, during which all readings must meet the standard.

³⁰ If one reading exceeds the level, daily monitoring must be performed for 10 successive days, during which all readings must meet the standard.

³¹ Timmons et al., 2001

³² Gilmour, 1998

There is some discrepancy in the recommended target values for oxygen in aquaculture. The standard in this document is influenced by research that demonstrates that oxygen saturation of 70% (7 mg·L⁻¹) will support maximum growth of rainbow trout.³³

The standards for on-site levels of toxic nitrogenous compounds are maximum thresholds and not intended to indicate an optimum target level.

Additional information for reviewing the second draft

These standards seek to ensure “functional welfare,” meaning fish are raised under environmental conditions that promote healthy growth and development while incurring minimal stress. Attending to these aspects of fish welfare is an important component of promoting fish health and minimizing the risks of associated environmental impacts. Other aspects of fish welfare that don’t have a clear environmental link, such as harvesting techniques (humane slaughter) are not addressed.

³³Pedersen, 1987; Edsall and Smith, 1990; Caldwell and Hinshaw, 1994

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.*

Note on auditing the feed standards:

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

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

Additional information for reviewing the second draft

The FTAD SC supports the creation of a feed dialogue to further address the many challenges of establishing standards for the responsible and efficient use of feed.

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 feed ingredients that make up more than 1% of the feed. ³⁴	Yes
5.1.2 Presence of a list of all ingredients that make up more than 1% of the feed.	Yes

Rationale

³⁴ Traceability should be at a level of detail that permits the feed producer to demonstrate compliance with the standards in this document (ie, marine raw ingredients must be traced back to the fishery, soy to the region grown etc). Feed manufacturers will need to supply the farm with third-party documentation of the major ingredients covered under this standard (marine ingredients, soy, etc)

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 major ingredients used in the feed, particularly such ingredients as land-animal byproducts.

Criterion 5.2 Responsible origin of marine raw materials

INDICATOR	STANDARD
5.2.1 Percentage of fishmeal and fish oil used in feed that comes from fisheries ³⁵ certified under a scheme that is ISEAL accredited and has guidelines that specifically promote responsible environmental management of small pelagic fisheries.	10% within 3 years of publication of the FTAD standards and 100% within 5 years
5.2.2 Prior to 100% achievement of 5.2.1, the Fishsource ³⁶ score required for the fisheries from which marine raw material in feed is derived (excluding trimming and by-products).	All individual scores ≥ 6 , and biomass score ≥ 8
5.2.3 Prior to 100% achievement of 5.2.1, demonstration of chain of custody and traceability for fisheries products in feed through an ISEAL accredited or ISO 65 compliant certification scheme that incorporates the United Nations Food and Agriculture Organization's "Code of Conduct for Responsible Fisheries."	Yes
5.2.4 Evidence that by-product feed ingredients do not come from fish species that are categorized as vulnerable, endangered, or critically endangered according to the IUCN Red List of Threatened Species. ³⁷	Yes

Rationale

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

³⁵ This standard applies to fishmeal and oil from forage fisheries and not to by-products or trimmings used in feed.

³⁶ Fishsource scores and their methodology are available here: <http://www.fishsource.org/site>. While the score must be counted using Fishscore methodology, Fishsource itself does not need to calculate the score.

³⁷ The IUCN reference can be found at <http://www.iucnredlist.org/static/introduction>

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

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

Given the current lack of certified sources of fishmeal and fish oil, the FTAD uses two interim standards to immediately promote steps toward responsible sourcing. First, Fishsource provides scores on many fisheries that can be roughly equated to the scoring system of MSC. Second, standard 5.2.3, seeks to have feed suppliers use the International Fishmeal and Fish Oil Organization (IFFO) Responsible Sourcing standard or a future equivalent that might emerge.

These standards support the use of marine trimmings and by-products, as long as they do not come from endangered or vulnerable fisheries.

Auditing guidance

While the Fishsource scores required under 5.3.2 must be calculated using Fishscore methodology, an organization other than Fishsource may calculate the scores.

Criterion 5.3 Dependency on wild-caught marine ingredients in feed

INDICATOR	STANDARD
5.3.1 Fishmeal Forage Fish Dependency Ratio (FFDR _m) for grow-out (calculated using formulas in Appendix III, subsection 1)	≤1.5
5.3.2 Compliance with one of the two following standards: a) Fish Oil Forage Fish Dependency Ratio (FFDR _o) for grow-out (calculated using formulas in Appendix III, subsection 1) <u>or</u> b) Maximum level of EPA/DHA content from marine sources as a percentage of fatty acids in the feed (excluding EPA/DHA from trimmings and byproducts)	a) ≤2.95 or b) ≤ 9%

Rationale

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

The ratios complement the standards described in criterion 5.2, which will move farms toward using feed with marine ingredients from fisheries certified as responsibly managed. Given the relatively finite amount of marine ingredients, trout producers and the aquaculture industry in general will need to continue to reduce their dependency ratios should they wish to continue expanding.

Additional information for review of Second Draft:

The levels in these standards were determined in a collaborative effort with the Salmon Aquaculture Dialogue and reflect better performers in the industry with regards to dependency on wild fisheries. The Fishmeal Forage Fish Dependency Ratio used here is slightly higher than the one that will likely be proposed in the Salmon Aquaculture Dialogue because freshwater trout are mainly produced in smaller sizes, which require a higher protein ratio in the feed.

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. ³⁸	Yes
5.4.2. Percentage of soy ingredients that are certified by the Roundtable on Responsible Soy, or equivalent. ³⁹	100% within 5 years of publication of the FTAD standards
5.4.3. Disclosure by the feed supplier of any ingredients that contain more than 0.9% transgenic ⁴⁰ plant material.	Yes
5.4.4. Disclosure by the farm to the direct purchasers of its harvested fish of any feed ingredients that have contained more than 0.9% genetically modified material	Yes

Rationale

³⁸ 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.

³⁹ The technical governance structure of the Aquaculture Stewardship Council must approve any other certification scheme as equivalent.

⁴⁰ 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.

The FTAD standards aim to promote responsible sourcing of all terrestrial feed ingredients, and in particular exclude feed ingredients that are sourced from areas where significant ecological damage has occurred. Producers are required to provide evidence that they are purchasing from feed manufacturers 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).

In addition, these standards support the Roundtable on Responsible Soy as the best available certification process known at this time for sourcing soy. Since the scheme is just now starting to certify soy, the standards allow 5 years for feed manufacturers to develop their supply chains.

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

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

Criterion 5.5 Energy consumption and greenhouse gas emissions (on farm)

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

Rationale

Climate change represents perhaps the largest environmental challenge facing our global ecosystem. Because of this, energy consumption used in food production has become a major source of concern. The FTAD recognizes the importance of efficient and responsible energy use. Therefore, these indicators will require that energy consumption in the production of fish be monitored on a continual basis and that growers should develop means to improve efficiency and reduce consumption of energy,

particularly those that are limited or carbon-based. Energy assessments are a new area for producers. Requiring that producers conduct these assessments will raise awareness and build capacity for documentation. In the future, the 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 second draft

Guidance still needs to be developed for conducting these assessments.

When publishing a final version of these standards, the FTAD SC will make a formal request to ASC to review methods for determining the full climate impact of trout farming and other aquaculture practices. The SC sees the biggest percentage of greenhouse gas emissions stemming from feed production and the fishing activity that brings in the raw material for feed.

Criterion 5.6 Non-therapeutic chemical inputs

INDICATOR	STANDARD
5.6.1 Percentage of combustibles contained in bunds ⁴¹	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 Demonstration that a farmer is aware of recycling facilities that are accessible to the farm, and demonstration of a commitment to use those facilities	Yes

Rationale

The construction and operation of trout farms can involve the use of hazardous chemicals (e.g., combustibles, lubricants and fertilizers) and the generation of waste. The storage, handling and disposal of such hazardous materials must be done responsibly, according to their respective 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, it is important to set a minimum percentage of recycled waste in the standards, understanding that many farms may be able to greatly exceed that minimum.

⁴¹ Bund: An embankment, retaining wall, dyke or quay along a waterway.

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 farms can be 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, farms are allowed to bury non-hazardous solid wastes on site, provided all precautions have been taken to prevent the contamination of surrounding surface and underground waters. Wastes that are not biodegradable must not be burned on site because of the possible emissions of toxic gases.

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 accredited by ISEAL.

Criterion 6.1 Child Labor

INDICATOR	STANDARD
6.1.1 Number of incidences of child ⁴² labor ⁴³	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.⁴⁴ 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 hazardous⁴⁵ to their physical or mental well-being. These protections are equally applicable to children who are paid workers and to children who are unpaid but their labor contributes to their families and their own welfare. To this end, the standards related to what constitutes child labor will protect the interests of children and young workers in certified aquaculture operations.

Auditing guidance

⁴² 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

⁴³ Child labor: Any work by a child younger than the age specified in the definition of a child.

⁴⁴ Young worker: Any worker between the age of child, as defined above, and under the age of 18.

⁴⁵ 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: Work that, by its nature or circumstances in which it is carried out, is likely to harm the health, safety or morals of workers.

- 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.

Criterion 6.2 Forced, Bonded, or Compulsory Labor

INDICATOR	STANDARD
6.2.1 Number of incidences of forced ⁴⁶ , bonded ⁴⁷ 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 physically leave the workplace and to manage their own personal time. Employers are never permitted to withhold original worker identity documents. Adherence to these policies shall indicate an aquaculture operation is not using forced, bonded or compulsory labor forces.

Auditing guidance

⁴⁶ 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).

⁴⁷ Bonded labor: When a person is forced by the employer or creditor to work to repay a financial debt to the crediting agency.

- 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).
- Employees shall be free to leave the workplace and manage their own time.
- 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.)

Criterion 6.3 Discrimination⁴⁸ in the work environment

INDICATOR	STANDARD
6.3.1 Evidence of proactive anti-discrimination practice ⁴⁹	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. The combination of both pro-active anti-discrimination policies and procedures as well as auditor verified worker testimony confirmation of anti-discrimination practices in the workplace is the strongest indication that a certified aquaculture farm, of any size, is not discriminating in the work environment.

Auditing guidance

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

- 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.
- Anti-discrimination policy is publicly displayed, very clear for all employees to see and understand, and translated into appropriate languages.

⁴⁸ 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.

⁴⁹ 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.

- Clear and transparent company procedures are outlined to raise, file and respond to discrimination complaints.
- Employers shall respect the principle of equal pay for equal work.

Evidence of incidences of discrimination (6.3.2)

- 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.

Criterion 6.4 Work environment health and safety

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

Rationale

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

- 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 and in the appropriate language.
- Emergency response procedures shall exist and be known by employees.
- Offer regular health and safety training for employees, including training on potential hazards and risk minimization, once a year and for all new employees.
- 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)
- Documentation shall be generated with regards to occupational health and safety violations.
- 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)

- 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

- 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.

6.4.5

The health and safety assessment must include at a minimum:

- An assessment of risks from slips, falls and drowning and relevant mitigation measures
- An assessment of risks from electric shock and electrocution, and relevant mitigation measures
- An assessment of risks from diving, and appropriate mitigation measures
- An analysis of the farm’s health and safety plan and emergency risk procedures
- An analysis of the farm’s protocol for receiving and acting on concerns/complaints that are raised about health and safety issues

Criterion 6.5 Wages

INDICATOR	STANDARD
6.5.1 The percentage of employees who are paid a basic needs wage. ⁵⁰	100%

⁵⁰ 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

Rationale

Workers shall be paid fair and equitable wages that, at a minimum, meet the legal and industry-standard minimum basic needs⁵¹ of workers and provide some discretionary income. A legal minimum wage will be considered a basic needs wage if it set in a manner consistent with the intent of ensuring basic needs are met. In instances where there is no legal minimum wage, or a legal minimum that is not set in the spirit of a basic needs wage, the auditor must determine an appropriate proxy for basic needs.

Certified aquaculture operations shall also demonstrate their commitment to fair and equitable wages by having and sharing a clear and transparent mechanism for wage setting and a 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

- 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.
- No disciplinary actions shall take the form of deductions in pay.
- Wages and benefits are clearly articulated to employees and are rendered to employees in a manner that is convenient to both employees and employer. Employees don't need to travel to collect benefits. Promissory notes, coupons or merchandise never replace cash, electronic or check payment methods.
- 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.
- 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.
- 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.
- A clear and transparent mechanism for wage setting shall be known to employees.

discretionary income, as well as legally mandated social benefits (e.g., health care, medical insurance, unemployment insurance and retirement).

⁵¹A legal minimum wage will be considered a basic needs wage if it set in a manner consistent with the intent of ensuring basic needs are met. In instances where there is no legal minimum wage, or a legal minimum that is not set in the spirit of a basic needs wage, the auditor must determine an appropriate proxy for basic needs.

- A labor conflict resolution policy shall be in place to track conflicts and complaints raised, as well as responses to conflicts and complaints.

Criterion 6.6 Access to freedom of association and the right to collective bargaining⁵²

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 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.

- 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.”

Criterion 6.7 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 ⁵³	Yes

⁵² 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.

⁵³ 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)

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 mental⁵⁴ 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.

Criterion 6.8 Overtime and working hours

INDICATOR	STANDARD
6.8.1 Violations or abuse of working hours ⁵⁵ and overtime ⁵⁶ 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

⁵⁴ Mental abuse: Characterized by the intentional use of power, including verbal abuse, isolation, sexual or racial harassment, intimidation, or threat of physical force.

⁵⁵ 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.

⁵⁶ All overtime shall be paid at a premium and should not exceed 12 hours per week. In the case of exceptional or emergency events, additional overtime hours are permitted. In such exceptional cases, which must pose an acute and long-term threat to the farm, workers will receive a premium wage and an equal amount of time off in addition to normal time off. Overtime work shall be voluntary, except in cases where it is legal and in which there is a collective bargaining agreement in place that permits compulsory overtime in order to meet short-term business demands.

must be compensated at premium rates⁵⁷. Requirements for time-off, working hours and compensation rates, as described elsewhere in this principle, should reduce the impacts of overtime.

Criterion 6.9 Interactions with communities

INDICATOR	STANDARD
6.9.1 For new farms, evidence of a third-party assessment ⁵⁸ that evaluates the impact a farm is having on the surrounding communities, including, at a minimum, an analysis of: <ol style="list-style-type: none"> 1. Economics 2. Natural resource access and use 3. Human assets 4. Physical infrastructure 5. Social and cultural resources 6. Governance 	Yes
6.9.2 Evidence of regular communication, engagement and consultation with surrounding communities	Yes
6.9.3 Evidence of an operational grievance and conflict resolution mechanism to address community concerns	Yes

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

1. Economic aspects (e.g., the influence of aquaculture on employment, conflict with or substitution of other livelihood strategies, poverty issues and income changes)
2. 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.
3. Human assets (e.g., food security, human health and safety, security risks, education and training, indigenous knowledge and practices)
4. Physical infrastructure (e.g., access to roads, electricity, telephones, changes in infrastructure and transport, housing, waste disposal systems)

⁵⁷ Premium rate: A rate of pay higher than the regular work week rate. Must comply with national laws/ regulation and/or industry standards.

⁵⁸ The impact assessment must be done by a credible third party and may form part of documentation prepared during the regulatory permitting process. See Appendix I for a consolidated list of environmental and social data that a farm must have.

5. Social and cultural aspects (e.g., cultural institutions and resources; indigenous rights and beliefs; gender, ethnicity and age disparities; and social networks)
6. 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. Although there are often many positive potential impacts of aquaculture operations on surrounding communities, the goal of the FTAD standards is to minimize any identified potential negative impacts. Therefore, the data in the social assessment will inherently be focused on indicating acknowledgement/ minimization of negative impacts rather than trying to prove a positive impact of an aquaculture operation on surrounding community. In addition to the assessment, 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. The assessment is required for new farms.

Auditing guidance

For 6.9.2, companies shall demonstrate regular communication, engagement and consultation through meeting logs, correspondence, public notices, announcements and other documentation. Engagement must be purposefully designed and conducted to understand the interests of neighboring communities and address potential concerns, where applicable. Communication and engagement may be through community organizations and representatives.

For 6.9.3, the grievance policy and mechanism should clearly outline a process for receiving, processing, and resolving complaints made by community stakeholders. “Resolution” need not imply that a grievance is always resolved in a manner preferred by the complainant, however the protocol for recognizing the complaint and taking corrective actions according to policies must be transparent, carefully adhered to and documented. The grievance procedure must ensure that all grievances are recorded and filed, and corrective actions, when appropriate, are taken and documented. When grievances are recorded, a timeline with actionable milestones toward resolution must be developed and made available to the complainant. An appeal process needs to be available if stakeholders feel that they have not been heard.

SECTION 7: STANDARDS FOR FINGERLING AND EGG SUPPLIERS

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

INDICATOR	STANDARD
7.1 Presence of documents issued by pertinent authorities proving compliance with local and national authorities on land and water use, effluent regulations and use of treatments	Yes
7.2 Unless the hatchery / fingerling facility is a completely closed system, no new introductions of exotic species from the date of publication of the FTAD standards unless approved for aquaculture in the jurisdiction by a process based on the International Council for the Exploration of the Seas (ICES)	Yes
7.3 Allowance for siting in National Protected Areas ⁵⁹	None ^{60,61}
7.4 Evidence of an assessment of the property for the presence of species listed on the International Union for Conservation of Nature (IUCN) “Red List of Threatened Species” as vulnerable, near	Yes

⁵⁹ 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.

⁶⁰ 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/

⁶¹ An exception is also made for farms located in protected areas that are designated as such after the farm already exists in that location. In these situations, the farm must demonstrate that its operation is compatible with the objectives of the newly protected area, and that it is in compliance with any relevant conditions placed on the farm as a result of the designation.

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

Rationale

The production of trout eggs and fingerlings can involve some of the same potential environmental and social impacts as a grow-out site. These 10 standards focus on the priority issues for this stage of production. These issues include: assurance the facility is complying with local regulations, appropriate siting, introduction of exotic species, health and biosecurity management, treatments, respect for ILO labor standards and being a responsible neighbor.

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

Additional Information for review of this draft

The Steering Committee has sought to make an abbreviated list of requirements for fingerling and egg suppliers that focuses only on the priority potential impacts for that stage of production. The SC welcomes feedback on whether these issues or others represent the main environmental and social issues associated with egg and fingerling production.

Standards around feed were not included in this section because only a minute fraction of all feed used to grow a trout is used at this early stage. Similarly, water quality standards were not included due to the low levels of nutrients released, and farms' inherent incentives to maintain excellent water quality inside the farm for fish health reasons. Escapes standards were not included because of the reduced ability for trout this size to survive in the wild.

Auditing Guidance

- 7.1 – Documentation might include: copy of operating permit, abstraction license, demonstration of compliance with effluent regulations, treatment records etc.
- 7.2 - Documentation might include: evidence of widespread farming of the species in that area prior to publication of the FTAD standards, a scientific paper that demonstrates the species was introduced or already established in the watershed prior to publication of the FTAD standards, or documentation of a process that followed ICES guidelines to introduce the species.
- 7.3 - Documentation might include: Map of hatchery location and all nearby protected areas.
- 7.4 - Documentation might include: An Environmental Impact Study, or a less formal study that uses IUCN tools to determine habitats for vulnerable, near threatened, endangered or critically endangered species.
- 7.5 - Documentation might include: Regulatory documentation around the facility's health status.
- 7.6 – Documentation might include: Detailed treatment log book or equivalent
- 7.7 - Documentation might include: Detailed treatment log book or equivalent compared against EU banned list.
- 7.8 - Documentation might include: Fish health management plan with veterinarian's signature
- 7.9 – Documentation might include: Company policies that cover the eight areas:
 - No child labor
 - No forced, bonded or compulsory Labor
 - No discrimination in the work environment
 - Work environment health and safety
 - Fair and decent wages
 - Access to freedom of association and right to collective bargaining

- Non-abusive disciplinary practices
- Fair compensation for overtime and working hours
- 7.10 – Documentation might include: Records of meetings or consultations with local communities

Appendix I: Assessment 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. In some instances, the assessment must include specific recommendations for mitigating impacts, as well as a timeframe for implementing those mitigation steps.

This information is required for new and existing farms. If an existing farm has only some of the required information from a previous study or regulatory filing, it will need to fill in the gaps of information that it does not have. If there have been changes made to an existing farm, a new assessment will be needed to review the pertinent sections of the assessment.

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

Principle 2:

Farmers must provide the following information:

- an analysis of habitats and ecosystems at the farm site and surrounding the farm, with a specific focus on identifying the farm's impact on:
 - o protected areas
 - o existing species listed on the IUCN Red List of Threatened Species as vulnerable, near threatened, endangered or critically endangered and their relevant habitats
 - o natural wetlands
- mitigation measures / restoration of functional wetlands in line with the requirements in Standard 2.1.2, if wetlands were subject to conversion for inlet and outlet infrastructure
- 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)
- (if needed) an analysis of why any exceptional 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-C

Principle 6

The assessment of community impacts only applies to new farms and 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: Water monitoring for land based systems

Sampling Regime for Water Quality Monitoring (Standard 3.2.1)

Phosphorus and nitrogen must be sampled using a 24-hour bulk sample, while total suspended solids (TSS), biochemical oxygen demand (BOD₅), ammonia and nitrites must be sampled in the early afternoon. Oxygen saturation will be measured in the early morning and late afternoon.

	Effluent discharge at farm ¹	Inlet	Frequency
Dissolved oxygen (mg/L or % sat.)	X		Monthly
TP (mg/L)	X	X	Monthly
TN (mg/L)	X	X	Semi-annually
TSS (mg/L)	X	X	Quarterly
BOD ₅ (mg/L)	X	X	Quarterly
NO ₂ -N (mg/L)	X		Semi-annually
NH ₃ -N (mg/L)	X		Semi-annually
Flow (L/sec)	X	X	Monthly

¹This refers to the effluent pipe discharge. In systems with multiple discharge points, each point will be sampled, or where all systems form one effluent stream, one sampling station is sufficient.

Appendix II-B: 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:

1. A process flow drawing that tracks/maps the water and waste flow of a farm including treatment of waste, transfer of wastes, waste storage and final waste utilization options. Flow diagram should indicate the farm is dealing with bio-solids responsibly. (Auditing guidance for evaluating whether the plan indicates responsible use: The system design shall allow for simple cleaning routines of pipes, sumps, channels, units.)
2. 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, fire, and drought. The management can be evaluated in relation to maintenance records.
3. Farm must keep detailed records/ log of sludge/ bio-solid cleaning and maintenance including how sludge is discard after being dug out of settlement ponds.
4. Biosolids accumulated in settling basins shall not be discharged into natural water bodies.

Appendix II-C: ASSIMILATIVE CAPACITY ASSESSMENT – CAGE SYSTEMS

All cage farms in lake or reservoir settings must demonstrate that an assimilative capacity assessment has been conducted to determine if there is sufficient capacity from a water quality perspective to allow for the level of proposed additional loading to the system. A similar assessment is also required for operations proposing a significant increase in production.

Many suitable models exist that can help determine assimilative capacity, such as Dillon and Rigler (1975), Kirchner and Dillon (1975), Reckhow (1977), Dillon and Molot (1996). The FTAD SC will not favor one existing model over another but consider it is important to outline key elements of a credible assimilative capacity study.

Elements of an empirical model to quantify existing nutrient conditions in a lake or reservoir include:

1. watershed area
2. surface area of waterbody, mean depth and lake morphology
3. land usage within watershed (forested, agricultural, urban)
4. geochemistry of watershed
5. atmospheric deposition
6. existing point and non-point source contributions to the waterbody
7. existing water quality monitoring data

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

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

These characteristics are important because these standards assume that sites must be established where there is good mixing of the surface and bottom waters, the bottom waters are not isolated within the water body and there is adequate dissolved oxygen levels naturally occurring in the bottom waters. In addition, the standards assume that enclosed basins with isolated bottom waters where there is no mixing with surface waters are not suitable, as they are at risk of depleting oxygen levels at greater depth.

Modeling calculates the current trophic status of the water body, which can be compared to water quality results.

The model must calculate the additional loading that would occur from the farm to determine the impact on lakewide TP concentration of lake, and ensure the loading is well within the water body's assimilative capacity.

Appendix II-D: Receiving water monitoring for cage based systems

Sampling Regime for Receiving Water Quality Monitoring

Stations will be established at the limit of the cage farm management zone on each side of the farm and at upcurrent and downcurrent reference stations. All water samples to be taken from a representative composite sample through the water column to a depth of the bottom of the cages. All sampling locations will be identified with GPS coordinates on a schematic outline of the farm operations and on available satellite imagery. Unless otherwise noted, samples will be taken monthly during the open water season. The boundary stations will be roughly 50 meters from the center line of the cage(s).

	Boundary Stations				Reference Stations	
	North	South	East	West	Upcurrent	Downcurrent
TP (mg/L)	X	X	X	X	X	X
DO profile (mg/L)	X	X	X	X	X	X

Appendix III: Feed resource calculations and methodologies

1. Forage Fish Dependency Ratio calculation

Feed Fish Dependency Ratio (FFDR) is the quantity of wild fish used per quantity of cultured fish produced. This measure can be weighted for fishmeal or fish oil, whichever component creates a larger burden of wild fish in feed. In the case of trout at current status, the fish oil usually will be the determining factor for the FFDR. The dependency on wild forage fish resources should be calculated for fishmeal and fish oil using the formulas provided below. In this 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:

1. Economic Feed Conversion Ratio (eFCR) is the quantity of feed used to produce the quantity of fish harvested.
2. The percentage of fishmeal and fish oil excludes fishmeal and fish oil derived from fisheries byproducts.⁶² 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.
3. 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.
4. 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.
5. Methodology is still being developed for calculating the EPA and DHA content as a percentage of fatty acids in the feed.

⁶² 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

1. 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.
2. 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.
3. Illegal, unreported and unregulated fish are excluded.

Responsible production

1. 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.
2. The farmer must be in possession of all relevant permits and licenses for the production and sale of fishmeal and fish oil products.
3. 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 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 up a fishery profile).
- The key relationship between the MSC scoring system and FS scores is MSC's 80 equals a FS 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 created 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.

- 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.