



ASC Shrimp Standard

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

Version control

Document version history:

Version:	Release date:	Effective date:	Remarks/changes:
V 1.2.1	14 July 2023	14 October 2023	<ul style="list-style-type: none"> • Calculations simplified for clarity • Standard scope updated to include <i>Metapaneus</i> species • Appendix X clarified with data submission requirements • Updates to meet ASC style requirements (e.g., formatting) • The content of the remaining Standard, as defined by criteria/indicators/ requirements under Principles remain unchanged
V 1.2	25 April 2022	25 October 2022	<ul style="list-style-type: none"> • Scope extension to include freshwater crustaceans • Addition of Indicators (2.1.2, 2.6.1 – 2.6.3, 6.4.1, 7.5.6) • Update of metrics (5.1.3, 7.4.1, 7.4.2b, 7.5.1, 7.5.2) • Improvement of clarity of requirements and rationales

			<ul style="list-style-type: none"> • Guidance moved to Appendixes • Update of timelines within Criterion 6.2 • References added and footnotes simplified
V 1.1	7 March 2019	15 March ,2019	Update of the standard to meet ASC style requirements (e.g., Inclusion of structure of the standards, formatting, and wording). Align the scope, 'about the ASC' and 'overview of the ASC system'. The content of the actual Standard, as defined by criteria / indicators / requirements under Principles [1-7], remains unchanged.
V 1.0	27 March, 2014	27 March, 2014	Update of the Standard to meet ASC style requirements (e.g., inclusion of introduction chapters 'about the ASC' and 'overview of the ASC system', formatting and wording). The content of the actual Standard remained unchanged from version 0.1.
V 0.1	13 March, 2014	13 March, 2014	Original version developed and approved by the Shrimp Aquaculture Dialogue Steering Committee under the original title "Shrimp Aquaculture Dialogue" and handed over to the Aquaculture Stewardship Council.

It is the responsibility of the user of the document to use the latest version as published on the ASC website.

To ensure the continued effectiveness of the ASC standards, as outlined in the ASC's Theory of Change, the revision must occur every three to five years. The next review of the ASC Shrimp Standard is intended for 2027.

Available language(s)

The official version of this document is English. The ASC may translate the Standard into additional languages as necessary. In case of any inconsistencies and/or discrepancies between available translation(s) and the English version, the online English version (pdf format) will prevail.

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ABOUT THE AQUACULTURE STEWARDSHIP COUNCIL (ASC)

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

The ASC standards define criteria designed to help transform the aquaculture¹ sector² towards environmental sustainability and social responsibility, as per the ASC Mission.

ASC Vision

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

ASC Mission

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

ASC Theory of Change

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

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

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

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

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

THE ASC DOCUMENT AND CERTIFICATION SYSTEM

ASC is a code compliant member of the [ISEAL Alliance](#) and implements a voluntary, independent third-party certification system³ consisting of three independent actors:

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

Scheme Owner

ASC, as scheme owner:

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

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

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

Accreditation Body

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

Assessment findings of ASI-accreditation audits and an overview of current accredited CABs is publicly available via the ASI website.⁴

Conformity Assessment Body

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

ASC Audit and Certification Process

The UoC is audited at the indicator level.

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

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

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

ASC Logo Use

ASC certified entities shall only use the ASC Logo, claims and/or trademarks if a Licence Agreement has been signed. A further Chain of Custody certification may be required if the trademarks are used on the product. For use on a product, on behalf of the ASC, the

⁴ <https://www.asi-assurance.org/s/>

Marine Stewardship Council (MSC) Licensing Team (MSCI) will issue licence agreements and approve logo use and claims. It should also be noted that obtaining farm certification or any other certification does not automatically guarantee the granting of a licence agreement. All use of the ASC logo and claims on promotional material needs to be submitted for approval before printing.

For more information see [ASC's Logo User Guide](#) or get in touch with logo@asc-aqua.org.

Unauthorised logo display or use of trademarks is prohibited and will be treated as a trademark infringement.

STRUCTURE OF ASC STANDARDS

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

ASC Standards are as follows designed:

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

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

SCOPE AND UNIT OF CERTIFICATION

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

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

- Principle 1 – Comply with all applicable international, national, and local laws and regulations
- Principle 2 – Site farms in environmentally suitable locations while conserving biodiversity and important natural ecosystems
- Principle 3 – Develop and operate farms with consideration for surrounding communities
- Principle 4 – Operate farms with responsible
- Principle 5 – Manage crustacea health and welfare in a responsible manner
- Principle 6 – Manage broodstock origin, stock selection and effects of stock management
- Principle 7 – Use resources in an environmentally efficient and responsible manner

The Criteria within the Principles apply to every UoC

Unit of Certification (UoC)

The applicable UoC is determined by the CAB/ auditor and adheres to the Standard's Criteria UoC-requirements as outlined in the CAR.

Biological and geographic scope to which the Standard applies

The ASC Shrimp Standard applies to all locations and scales of crustacean farm-based aquaculture production systems in the world. The ASC Shrimp Standard currently covers species under the genera *Macrobrachium*, *Cherax*, *Procambarus*, *Astacus*, *Metapaneus* and *Penaeus*. The metrics for Penaeid shrimp are oriented towards the production of *P. vannamei* and *P. monodon*. *P. merguensis*, *P. stylirostris* and *P. japonicus* can be certified if they can meet the requirements set for *P. monodon*.

How to read this document?

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

Definitions are provided in footnotes.

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

Metric Performance Levels

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

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

Impact: Farm operations that, intentionally or unintentionally, break the law violate a fundamental benchmark of minimum performance for certified farms.

Criterion 1.1 Documented compliance with local and national legal requirements

INDICATOR	REQUIREMENT
1.1.1 Compliance with local and national laws or regulations	Proofs of permits or other relevant documentation available for applicable local and national laws or regulations
1.1.2 Transparency on legal compliance	Government-issued operational permits and licenses are publicly available one month after request

Rationale - Globally, governments have been unable to effectively regulate industrial activities due to the challenges of promoting economic growth while maintaining biodiversity. This has resulted in significant environmental and social impacts in both developed and developing countries. Principle 1 requires certified crustacean producers to follow national and local laws of the region in which their operations take place. It does not intend, nor is it desirable, to evaluate the quality or rigour of the legislative system of the producing country/region; rather, it ensures that the basic starting point for a crustacean farm seeking certification under this Standard is compliance with national and local laws. In other words, the farm must be legal where it operates. Where necessary, in subsequent principles, the ASC Shrimp Standard goes beyond the minimum legal requirements to produce a more rigorous standard.

Public transparency is included in the Standard to ensure that communities potentially affected by activities of the crustacean farm have access to information to ensure that the farm is operating responsibly within the country's legal system. ASC believes that this increases the probability of both the communities and farmers acting as responsible neighbours.

The ASC Shrimp Standard intends for producers to present auditors with evidence demonstrating compliance with applicable regulations. Cross-country comparisons of “adherence to the law” will not take place under this certification, as the other major issues of concern are addressed in subsequent ASC Shrimp Standard Principles, thus rendering the need for legislative evaluations unnecessary.

PRINCIPLE 2: SITE FARMS IN ENVIRONMENTALLY SUITABLE LOCATIONS WHILE CONSERVING BIODIVERSITY AND IMPORTANT NATURAL ECOSYSTEMS

Impact: Inappropriate and unplanned siting of crustacean farms may result in production failures, ecological degradation, land-use conflicts and social injustice. Thus, it is imperative when crustacean farms are established that due consideration is given to the environment, ecologically sensitive habitats, other land use in the vicinity and the sustainability of the crustacean farming operations. Principle 2 covers the impacts associated with initial siting, construction, and expansion of crustacean farms; social considerations associated with siting are addressed in Principle 3.

Biological diversity, or biodiversity, is the term given to the variety of life on Earth and the natural patterns it forms. The ASC Shrimp Standard considers the maintenance of biodiversity of critical importance, as it is a key to the preservation of healthy ecosystems.

Principle 2 acknowledges the authority of major international conventions governing biodiversity conservation such as the Convention on Biological Diversity and the Ramsar Convention on Wetlands, recognising that such agreements represent general international consensus on key biodiversity issues. The Standard recognises the need to conserve biodiversity at the ecosystem, habitat, and species levels. In addition to patterns of biodiversity, the Standard aims to preserve the processes that sustain biodiversity. Principle 2 approaches the complexity and “data deficiency” realities of biodiversity and ecosystems in tropical countries by focusing on single issues such as mangroves and wetlands. At the same time, the Standard has been designed to direct stakeholders and governments toward a broader appreciation of biodiversity by incorporating planning tools that reflect ecosystem values.

Both the B-EIA process and the Participatory Social Impact Assessment (pSIA – see Principle 3) allow for honest dialogue with stakeholders around the farms. These processes help farmers to address negative impacts and to avoid the need to mitigate or compensate for unforeseen damages.

Criterion 2.1 Biodiversity Environmental Impact Assessment (B-EIA) and Site Location

INDICATOR	REQUIREMENT
2.1.1 Farm owners shall commission a participatory B-EIA and disseminate results and outcomes openly in locally appropriate language. The B-EIA process and document must follow the outline in Appendix I.	Completed
2.1.2 Site location, history and stewardship activities matrix located in Appendix II, Table 1 is completed and validated	Yes

Rationale - Data availability (including comprehensive maps of ecologically sensitive habitats, such as mangroves and other coastal ecosystems, and other land use in the vicinity important for local livelihoods) is currently one of the major challenges facing standards development and implementation. Given the potential impact of crustacean farming on biodiversity due to farm siting (see Rationale 2.2) and the complexities of defining site-specific critical habitats and ecosystem impacts, the ASC Shrimp Standard mandates the use of B-EIAs for existing farms, prior to the development of new crustacean farms, and for the expansion of existing farms. Transparency and public disclosure of Environmental Impact Statements is also an effective method to ensure that a B-EIA process is relevant, fair, and credible, and B-EIAs under the ASC Shrimp Standard, are required to be transparent.

A framework and guidance for B-EIA has been developed by the Convention on Biodiversity (CBD, n.d.) to integrate biodiversity issues into EIAs, an existing and effective planning tool. B-EIAs are mandated by the ASC Shrimp Standard to ensure that existing impacts, and the risk of future impacts, are identified at the farm and ecosystem level and to help farmers demonstrate compliance with the biodiversity and ecosystem components of the ASC Shrimp Standard. B-EIAs aim to ensure that biodiversity, ecosystem interests and ecosystem effects are identified and addressed in an impact assessment process. This includes related development planning and operations

management. In practice, countries have different definitions and associated guidelines, although the basic process of Impact Assessment is remarkably similar.

B-EIAs create a deeper understanding of the importance of the local ecosystem to the sustainability and success of crustacean farm operations. Farmers will also be able to determine which ecosystem elements need to be maintained to reduce risks of conflict with wider societal stakeholders and be able to demonstrate good practice. The ASC Shrimp Standard recognizes that the costs associated with assessments could be a significant barrier for many farmers interested in ASC Shrimp Standard certification, and it is expected that mechanisms will be developed at the ASC level to address this issue. See Appendix I for further details including a matrix that helps differentiate the requirements for small and large farms.

Continuous improvement for 2.1

The ASC Shrimp Standard considered the possibility of including High Conservation Value Area (HCVA) assessments and systematic conservation planning. HCVA methods are not sufficiently developed for freshwater and marine aquaculture systems at the current time. Future versions of the Standard will revisit these ideas, and it is expected that the identification of HCVAs will be required by the Standard in the future. The identification of HCVAs will improve data gathering and support governance mechanisms responsible for assuring responsible regional land/coastal zone use. While more general methods of spatial planning currently exist, their use is challenged by the farm-level scale of certification. Given that cumulative impacts of multiple farms across landscapes can be significant, this represents a serious gap in the ability of the Standard to mitigate environmental impacts. As a critical mass of farms enter certification, regional planning processes may become a possibility, particularly if supported by/in collaboration with responsible government agencies. This issue will be a priority when the ASC Shrimp Standard is revised.

The information required in Appendix II provides the historical context of a particular site where the crustacean aquaculture activity is being conducted. There is a functional need for the specific location and surrounding site description so the physical conditions of the farm in relation to the greater environmental context can be taken into consideration during the assessment process.

Guidance for implementation

2.1.1: See Appendix I for further details including the matrix that helps differentiate the requirements for small and large farms.

2.1.2: See Appendix II for the matrix to establish the context in which the farm operates.

Criterion 2.2 Conservation of protected areas or critical habitats

INDICATOR	REQUIREMENT
<p>2.2.1 Allowance for siting in Protected Areas (PAs).⁵</p>	<p>None, except within PAs with IUCN category V (IUCN 2021a) if the farming system is regarded as traditional land use⁶, or category VI if the farm was built legally prior to the designation of the PA and in both cases is in compliance with the management objectives and plan of the PA, and crustacean farming is no more than 25% of the total PA area.</p>

⁵ **Protected Areas:** “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” (Dudley, 2008).

⁶ **Traditional Land use aquaculture:** “an indigenous form of farming and a result of the coevolution of local social and environmental systems that exhibit a high level of ecological rationale expressed through the intensive use of local knowledge and natural resources, including the management of agro/aqua-biodiversity in the form of diversified agri- and aquaculture systems.” (Altieri, 1995).

<p>2.2.2 Allowance for siting in mangrove ecosystems⁷ and other natural wetlands⁸ or areas of ecological importance as determined by the B-EIA or national/state/local authority plans/list.</p>	<p>None for farms built (with or without permits) after May 1999, except for pumping stations and inlet/outlet canals provided they have been permitted by authorities and an equivalent area is rehabilitated⁹ as compensation.</p> <p>For farms built or permitted before May 1999, farmers are required to compensate/offset impacts via rehabilitation as determined by the B-EIA, or the national/state/local authority plans/list, or 50% of the affected ecosystem (whichever is greater).¹⁰</p>
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Rationale - This criterion focuses on areas that have protected status, are of ecological importance and might have historically received inadequate protection when the land was converted into crustacean farms. PAs are internationally recognised as a major tool in conserving species and ecosystems.

Although PAs are easy to define as a conservation tool, in practice the precise purposes/values for which protected areas are managed sometimes differ. Human activities such as crustacean farms may occur within PA IUCN category V, if considered traditional land use, category VI according to the IUCN criteria and, in some countries, in category IV in some countries (these will be considered on a case-by-case basis by the ASC Technical Advisory Group in consultation with the specific PA authority). In some instances, the PAs may have specific zones within them where other uses are permitted

⁷**Mangrove Ecosystems:** one of the world’s most unique and productive ecosystems. Mangroves are woody plants that live between the sea and land, in areas which are flooded by tides for part of the time (Miththapala, 2008).

⁸ **Natural Wetland:** non-artificial (i.e., not human made) areas of marsh, fen, peatland or water, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres. They may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands’. (Ramsar, 1971).

⁹ Guidance on mangrove restoration is provided in Appendix III.

¹⁰ Mangrove areas preserved within the farm can be considered as part of the compensation (e.g., if a farm has 2ha, but they kept 1ha with mangroves inside the farm, they can be considered in compliance).

(e.g., within category IV there is sometimes allowance for small zones of crustacean farming). These zones must be no more than 25% of the total PA area. Certifying farms within PA IUCN category V or VI, or within sub-zones, is only allowed with the approval of the PA management authority and related stakeholders if there is no conflict with the management objective of the PA. No new farms or expansions built within PAs after the publication of the ASC Shrimp Standard in 2014 will be considered for certification. Tools to be used for ensuring compliance include National Protected Area maps, EIA assessments and protected area management consent.

Coastal wetlands are rich in biodiversity and are highly productive. They are the grazing and breeding ground for many marine species and provide habitat for a wide variety of resident and migratory birds. As such, they are considered critical habitats¹¹ and High Conservation Value Areas (HCVAs). HCVA methodologies are being developed rapidly in differing production contexts around the world.¹² However, these methodologies are not yet sufficiently developed for inclusion in the ASC Shrimp Standard.

One of the greatest impacts of crustacean farming has been deforestation and the impacts of farms sited in mangroves and other critical habitats. These habitats have been compromised by a variety of coastal development activities, including aquaculture. It is estimated that 10-38% of mangroves have been lost to shrimp aquaculture, with global losses on the order of 40-50% (Boyd, 2002; Hassan *et al.* 2005). Mangroves serve critical ecosystem functions including stabilising soil erosion, reducing wave energy and storm surges, diminishing the effect of high winds, filtering runoff entering coastal waters from rivers (sedimentation and biofiltering), maintaining water quality for inland aquaculture, providing habitat for many birds and marine organisms, performing a nursery function for marine and estuarine species, being used by humans for food gathering (e.g., fish, reptiles, shrimp, crabs) and other uses (e.g., construction materials, fuel wood, employment) and carbon sequestration (Twilley, Chen & Hargis, 1992).

Wetlands provide fundamental ecological services and are sources of biodiversity at species, genetic and ecosystem level. Wetlands constitute a resource of great economic, scientific, cultural, and recreational value for communities. Wetlands play a vital role in climate change adaptation and mitigation. Wetlands should be restored and rehabilitated, whenever possible, and conserved by ensuring wise use. Within the ASC Standards, 1999 is the benchmark for the definition and scope of “wetland conservation.”

¹¹ **Critical habitat:** specific geographic areas that contain features essential to the conservation of an endangered or threatened species and that may require special management and protection, or areas not occupied by the species but which may be essential for its conservation (US Fish and Wildlife, 2021)

¹² www.hcvnetwork.org

This is the year that the “Convention on Wetlands of International Importance”¹³ was approved. The convention provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

Cutting mangroves or altering natural wetlands is only acceptable for building pumping stations and inlet/outlet canals. Under this Standard, any farms built in these types of habitats prior to the 1999 Ramsar resolution are required to compensate/offset the habitat alterations by rehabilitating 50% of the area affected by the farm. Any mangrove removal must be compensated by allowing the natural regrowth or reforestation in an equivalent area, using indigenous species adapted to the specific hydrological conditions of the farm site. When reforesting, plantings shall be done to create forests with similar relative composition and must include 80% of tree species that were in the original communities. Removal of natural wetlands must also be compensated by creating areas that possess similar ecological characteristics.¹⁴

Guidance for effective mangrove restoration presented in Appendix III is offered to assist farmers in their efforts to restore wetlands. This is also intended to clarify how farmers’ reforestation programs will be evaluated in audits.

¹³ <http://www.ramsar.org/>

¹⁴ **Similar ecological characteristics:** environments with the same (not statistically significantly different at the p=0.05 level, based on at least three randomly sampled transects) density of the top five community-dominant species, species richness within 10% of the original and composition showing the same ordering of dominants. This will be determined through initial baseline monitoring during audits for established farms, or via EIAs, for new or expanding farms.

Criterion 2.3 Consideration of habitats critical for endangered species

INDICATOR	REQUIREMENT
<p>2.3.1 Allowance for siting farms¹⁵ in critical habitats of endangered species¹⁶ as defined by the IUCN Red List, national listing processes¹⁷ or other official lists.</p>	<p>None</p>
<p>2.3.2 Maintain habitats critical for endangered species within farm boundaries and implement protection measures of such areas as identified by the B-EIA process</p>	<p>Yes</p>

Rationale - Criterion 2.3 addresses habitat considerations for endangered species, recognising that certain habitats serve essential functional uses for some or all of the key life stages of these species. The IUCN Red List of Threatened Species¹⁸ is a global inventory of the conservation status of plant and animal species. A series of “Regional Red Lists” are produced by countries or organisations, which assess the risk of extinction to species within a political management unit. The IUCN Red List uses criteria that evaluate extinction risks that are relevant to all species and all regions of the world. ISRSP

¹⁵ Farms starting construction or expanding.

¹⁶ **Endangered Species:** a population of organisms which is at risk of becoming extinct because it is either few in numbers or threatened by changing environmental or predation parameters (IUCN).

¹⁷ Any process that occurs at the national, provincial, state, or other level within-country that evaluates species conservation status against a set of defined criteria recognized by relevant governance. Such listing processes may legally binding (e.g., Endangered Species Act in the U.S.A. or the Species at Risk Act in Canada) or may not be legally binding. (e.g., species listings created by COSEWIC in Canada (Committee on the Status of Endangered Wildlife), or the Red Data Book in Vietnam).

¹⁸ www.iucnredlist.org

Standards refer to the four categories that confer the greatest risk (near threatened, vulnerable, endangered, and critically endangered).

The ASC Shrimp Standard seeks to identify and protect critical habitats for species at risk in areas where crustacean farms are located. While mangrove forests¹⁹ and wetlands are acknowledged as habitats that provide valuable human and ecological services and regularly overlap with crustacean farming regions, other habitats are also at risk. Such areas may be considered critical for a variety of reasons, which are broadly defined by the fact that they are necessary resources for species that use them for cover, reproduction, etc.

Critical habitat is ideally defined using life-history information and population viability analyses to ascertain which life stages most influence population trajectories (as defined by the elasticity of population growth rates) (Mangel, Levin & Patil, 2006). Such information shows which life stages most influence population growth and, therefore, identifies which functional habitats with their corresponding behaviours deserve protection. For example, if a juvenile life stage is limiting, protecting foraging grounds for juveniles may be more important than protecting breeding grounds for adult life stages.

The real costs of intensive science to determine such information are prohibitive in the context of certification, particularly for small-scale farmers. Recognising its limitations, the ShAD has adopted a proxy-based approach that aims to protect the main component of critical habitat for species that are recorded in a national listing process.

Guidance for implementation

2.3.1 and 2.3.2: Under this requirement, farmers are required to monitor what species are on their site and ensure that they do not impact these important species during the construction and operation of the farms. Existing farms sited in habitats that are critical for Red List species may not be certifiable if they cannot find ways to restore habitat or offset the impacts of their initial siting. ASC recognises the challenge of assessing the state of the farming site prior to its establishment; however, the Standard requires that farmers attempt to do so to the greatest extent possible.

¹⁹ **Mangrove Forest:** an association of halophytic trees, shrubs, palms, ferns and other plants growing in brackish to saline tidal waters on mudflats, riverbanks and coastlines in tropical and subtropical regions. This vegetation has the common characteristic of living in the zone inundated by the highest tides and exposed by the lowest tides. All mangrove species also share a common characteristic of salt tolerance (Mitsch & Gosselink, 1993).

Criterion 2.4 Ecological buffers, barriers, and corridors

INDICATOR	REQUIREMENT
2.4.1. Coastal barriers: Minimum permanent barrier (or natural) between farm and marine environments. ²⁰	As defined in legislation at the time of construction, or as determined by the B-EIA, or following the indications in the Guidance below, whichever is greater.
2.4.2. Riparian buffers: Minimum width of permanent native and natural vegetation between farms and natural ²¹ aquatic/brackish environments. ²²	As defined in national legislation at the time of construction, or as determined is necessary by the B-EIA, or following the indications given in the Guidance below, whichever is greater.
2.4.3. Corridors: Minimum width of permanent native and natural vegetation through farms to provide human or native wildlife movement across agricultural landscapes.	As defined in national legislation at the time of construction, or as determined necessary for wildlife by the B- EIA, or access issues identified during B-EIA/p-SIA. Needs for wildlife movement identified during B-EIA.

Rationale - Criterion 2.4 addresses the retention of biological features in relation to abiotic or landscape features. Coastal vegetation and mangroves serve an important

²⁰ For open coastlines and adjacent natural water bodies, the zone of natural vegetation must be 100m wide. Man-made permanent barriers also need to be 100m wide

²¹ Artificial canals or natural waterways that have undergone considerable man-made modification are not considered in this standard.

²² For Riparian buffers, vegetation must be dominated by tree/forest/vegetation cover consistent with natural endemic riparian zones within < 5km of the farm in question.

protective function for coastal communities by breaking onshore waves and winds at the land/sea interface, especially during storm surges. The magnitude of energy absorption strongly depends on forest/soil attributes. Coastal mangrove buffers vary widely from 100m to 2 km in width. Mangroves also stabilise soil against erosion and filter runoff entering coastal water from rivers (Boyd, 2002). Consideration was given to the siting of barriers/buffers between farms and the surrounding landscape matrix. Three types of barriers/buffers were considered: 1) between farms and coastlines; 2) between farms and aquatic ecosystems (rivers and surface waters); and 3) between farms and terrestrial ecosystems (wild, agricultural, or developed land). One of the most important reasons for buffers between farms and agricultural land is to eliminate the impact of salinisation: these concerns are currently covered under requirements preventing salinisation (Criterion 2.5) and therefore are not addressed through buffers.

Coastal Barriers: The ASC Shrimp Standard requires a minimum barrier (artificial or natural) between farm and aquatic or marine environments as defined in national legislation at the time of construction to mitigate concerns related to storm or flood risks identified in B-EIA. The farm must demonstrate adequate protection from storm or flood events.

The ASC Shrimp Standard acknowledges that farms generally have little control over the land practices between their own holdings and shorelines. Including a minimum buffer strip between farms and oceans ensures that ponds cannot occupy the sea-water interface, which is a high-risk farming area where it is more difficult to control environmental events that are directly linked to escapes and disease transfer. A second benefit of coastal buffers is that they ensure that communities have an area in which to access marine resources.

Riparian Buffers: Riparian habitats are considered important in tropical agricultural countries; however, there is no one-size-fits-all description of an ideal riparian buffer strip (Fischer & Fischenich, 2000). While other requirements in the ASC Shrimp Standard address water quality and salinisation, recommended widths for ecological concerns in buffer strips typically are much wider than those recommended for water quality concerns (Fischer, 2000; Fischer *et al.* 1999).

Corridors: Corridors are essential ecological features that allow the movement and dispersal of organisms between suitable patches within a landscape. Maintaining the potential for organisms to move freely and within the safety of appropriate habitat is essential for the maintenance of essential functions such as foraging and breeding.

Continuous improvement

Instead of using a discrete and generic coastal buffer recommendation, countries are strongly encouraged to use the most current numerical models available (e.g., Koh et al. 2009) to examine how coastal buffers can vary along different sections of coastline. Such efforts are outside the scope of auditing or B-EIAs but are acknowledged as best practices and would make use of the best available science. Collaborative efforts by national agencies and local municipalities should make such recommendations public, then work to attain such buffers, potentially buying back developed land in areas that would be best used for coastal protection.

Guidance for implementation

2.4.1 and 2.4.2: For riparian buffers, vegetation must be natural and permanent, and must be dominated by natural vegetation cover consistent with natural endemic riparian zones within less than five km of the farm in question. The width of the buffer or barrier zones must comply with legal requirements at the time of construction, or in absence of such legislation, follow the conclusions of the B-EIA, or by default follow the following criteria, whichever is greater. For coastlines, lagoons or lakes, the zone of natural or restored vegetation must be 100m wide. For confined natural watercourses, such as rivers or streams, the zone of natural or restored vegetation must be at least 25m wide on both sides. Canals constructed after the release of the Standards cannot replace natural waterways.

Criterion 2.5 Prevention of salinisation of freshwater and soil resources

INDICATOR	REQUIREMENT
2.5.1. Allowance for discharging saline water to natural freshwater bodies. ²³	None
2.5.2. Allowance for the use of fresh groundwater in ponds.	None
2.5.3. Water-specific conductance or chloride concentration in freshwater wells used by the farm or located on adjacent properties. ²⁴	For all freshwater wells (identified prior to full assessment), specific conductance may not exceed 1,500 mhos per centimetre and/or chloride concentration may not exceed 300 milligrams per litre. ²⁵

²³ Surface freshwater bodies adjacent to farm property or receiving waters discharged from the farm. Freshwater is characterized by a specific conductance of less than 1,500 μ mhos per centimetre and a chloride concentration of less than 300 milligrams per litre. These values correspond to salinity inferior to 1 ppt. Farms that can demonstrate that surrounding waters and soils have a salinity of 2 and above using a hand-held refractometer will not be required to provide measurements of conductance or chloride concentration. Water bodies displaying freshwater conditions only during the peak rainy season are considered as brackish water bodies under these standards.

²⁴ Exceptions are made if it can be demonstrated that seawater intrusion or other phenomenon outside the control of the farmer is responsible for the increase.

²⁵ Specific conductance or chloride concentration must be monitored at a frequency adapted to possible fluctuations because of natural factors such as rain regime, and comparisons with first-year values.

<p>2.5.4. Soil-specific conductance or chloride concentration in adjacent land ecosystems and agricultural fields.^{26 27}</p>	<p>No net increase when compared to the first year of monitoring.</p>
<p>2.5.5. Specific conductance or chloride concentration of sediment prior to disposal outside the farm.</p>	<p>The specific conductance or chloride concentration values must not exceed those of the soil in the disposal area.²⁸</p>

Rationale - Crustacean ponds contain saline water and, if located above freshwater aquifers, infiltration through bottom soil may cause groundwater salinisation (Boyd et al. 2006). Lateral seepage beneath or through pond embankments can also cause soil and surface water salinisation near farms. All ponds seep to a certain extent; however, some seep worse than others. A recent literature review found that normal seepage from aquaculture ponds did not exceed 20cm per month (Boyd 2009).

The ASC Shrimp Standard determined that crustacean farms must not extract freshwater from underground sources to dilute salinity in ponds due to the important volumes of freshwater that would be used for such activities. In coastal areas, pumping fresh groundwater can depress the water table, allowing saltwater to intrude into aquifers (Anonymous 1993). Salinisation of freshwater aquifers can interfere with water supplies and, in the case of shallow aquifers, cause crop root damage. In addition, land subsidence can result from excessive pumping of groundwater (Chen 1990).

The release of effluents can cause salinisation in surface freshwater bodies and non-saline soils near farms. The ASC Shrimp Standard determined that saline water must not be released in natural freshwater bodies. Many crustacean farms, especially those using

²⁶ Exceptions are made if it can be demonstrated that seawater intrusion or other phenomenon outside the control of the farmer is responsible for the increase.

²⁷ Soil salinity must be measured 25 metres within adjacent land ecosystems and agricultural fields every six months. If salt contamination is detected at the 25-metre station, the monitoring could be extended further out as necessary. No progressive increase of specific conductance or chloride concentration should be observed over the years when compared to the first year of monitoring.

²⁸ If a farmer has a contract outside the farm to discharge soil in a specified location, they are permitted to do as long as no disposal occurs in a natural habitat or public property without written permission of the community.

intensive culture methods, accumulate sediments in ponds and canals, which are mechanically removed at times. Sediment disposal sites can cause salinisation of surface water if rainfall leaches salts from them and runoff enters freshwater bodies (Boyd et al. 1994). Saline runoff can also flow onto non-saline soil areas causing salinisation of surface soil. Water from sediment disposal areas can infiltrate and lead to the salinisation of freshwater aquifers. Dry sediments can be used for landfill or disposed of by being spread in agricultural areas, provided the salt content of sediment is not higher than in the soil of the disposal site.

The ASC Shrimp Standard requires monitoring of chloride concentration or specific conductance levels in soil (including sediment disposal sites), surface water and groundwater near crustacea farms, as an increase will indicate salinisation has taken place. Historical data on either will often not be available; thus, the first values taken at the onset of the certification program will serve as the reference point for each site. The ASC Shrimp Standard has set freshwater limits to 1,500 μmhos per centimetre specific conductance and 300 milligrams per litre of chloride. These levels are based on data presented by Boyd (2000) indicating that freshwater has < 1,000 milligrams per litre total dissolved solids (TDS), and a TDS-specific conductance ratio of 0.65, while the chloride has a TDS ratio of around 0.30.

Guidance for implementation

2.5.1, 2.5.2 and 2.5.3: Hand-held refractometers are widely used to measure salinity in crustacea farms. These devices are appropriate for salinities of approximately 2 or 3 ppt, but they are not sensitive enough for use in determining if crustacea farms are causing the salinisation of freshwater bodies. In this case, alternative methods may be employed. The quickest and easiest method for evaluating the salinity status of water is to measure specific conductance with a conductivity meter. However, this instrument costs about US \$1,000 and small-scale farmers may not be able to afford it. An alternative is a chloride test kit; several companies sell these kits for less than US \$100. Note: When purchasing kits, chloride kits must not be confused with chlorine kits.

2.5.4 and 2.5.5: Various methods exist for measuring the chloride concentration of soils. Specific conductance can be measured in solution or through filtering a solution and measuring the chloride concentration. The greater the specific conductance or chlorine concentration, the more saline the soil (e.g., Australian Government, 2021).

Criterion 2.6 Water use/abstraction levels

INDICATOR	REQUIREMENT
2.6.1. Farm complies with water allocation limits set by local authorities or a reputable independent institution. ²⁹	Yes
2.6.2. All use of underground pumped water has been permitted by regulatory authorities	Yes
2.6.3. Well depths are tested at least annually, and results made publicly available. ³⁰	Yes

Rationale - Water use is an increasingly important global issue, and its efficient use is an important part of responsible production. Groundwater requires attention because it represents the abstraction and displacement of typically higher-quality water. Well or aquifer recharge is the process of water being replenished in the ground. When abstraction increases beyond the rate of recharge, the result is a net reduction in the water table.

²⁹ A reputable independent institution can be a government organisation, an academic institution or an organisation that is not linked specifically to the aquaculture sector, but has generated water use parameters for the region, or is responsible for water allocation. Reputability of the institution shall be demonstrated by the farmer showing peer reviewed articles and/or reports on water allocation. Documents produced for a sector other than aquaculture are also acceptable. A track record of at least three years of operation must be available

³⁰ Well depth must be tested at similar times of the year, with results submitted to ASC. Wells that are by law not allowed to be opened are exempt from this indicator

PRINCIPLE 3: DEVELOP AND OPERATE FARMS WITH CONSIDERATION FOR SURROUNDING COMMUNITIES ³¹

Impact: Although crustacean farms are often the economic backbone of local communities, they can also have a negative impact on local communities, such as reducing public access to land and water resources and jeopardising livelihoods.³²

³¹ **Community:** A group of people with possibly diverse characteristics who are linked by social ties, share common perspectives, and are joined by collective engagements within a geographically confined area. Four indicators:

1. A state of organized society in small form (town, village, hamlet) that recognizes a single representative (leader, formal or informal)
2. The people inside a confined geographical area; small enough to allow face-to-face interaction as the main form of contact between the individuals within the group
3. Having a common good or a common interest and recognizing that and been recognized as having that.
4. A sense of common identity and characteristics ('we' versus 'them' feeling) on either/or social, cultural, economic, ethnic grounds.

³² This principle seeks to minimize injustice or unrest in affected communities that may result for crustacean farming activities. The standards recognize that it is only possible to be socially equitable to the point that legal frameworks and negotiated outcomes allow. Nonetheless, ASC believes this standard represents a significant improvement from past and current social realities and will seek to continuously strengthen them.

Criterion 3.1 All impacts on surrounding communities, ecosystem users and landowners are accounted for and are, or will be, negotiated in an open and accountable manner

INDICATOR	REQUIREMENT
<p>3.1.1. Farm owners shall commission or undertake a participatory Social Impact Assessment (p-SIA)³³ and disseminate results and outcome openly in locally appropriate language. Local government and at least one civil society organisation chosen by the community shall have a copy of this document. The p-SIA process and document includes a participatory (shared) impact and risk analysis with surrounding communities and stakeholders.³⁴</p> <p>The participatory element (community input and response) is visibly included in the report. Outcomes as agreed between farm and surrounding community on how to manage risks and impacts are included in the report.</p>	<p>The p-SIA report adheres to the steps outlined in Appendix IV; is available in the local government, the community and through the chosen community civil organisation; and the report lists dates of meetings and names of participants.</p>

³³ **Participatory Social Impact Assessment (p-SIA):** An assessment of positive and negative consequences and risks of a planned or ongoing project (here: a farm or farm development) undertaken in such a manner that all stakeholder groups have input in process, results, and outcome of such an assessment, and the steps taken, and information gathered is openly accessible to all. See Appendix IV.

³⁴ **Stakeholder:** A person, group, or organization that has direct or indirect stake in an organization because it can affect or be affected by the organization's actions, objectives, and policies.

Rationale

Credible social sustainability standards must be able to respond to real human concerns that arise in communities located near the farm in addition to those within its overall operations. Appropriate consultation must be undertaken within local communities so that potential conflicts are properly identified, avoided, minimised and/or mitigated through open and transparent negotiations based on an assessment of risks and current impacts on the surrounding communities. Communities will have the opportunity to be part of the assessment process. The impacts of aquaculture operations on minorities and those prone to discrimination will be accounted for and opportunities for these groups of people should be identified, evaluated, and addressed. Negative impacts may not always be avoidable; however, the process for addressing them must be open, fair and transparent. Therefore, these community requirements focus on due diligence through dialogue and negotiation with surrounding communities. The p-SIA report forms the basis for assessing compliance to Criterion 3.2 and 3.4. Where the UN agreement on ethnic minorities and indigenous peoples (United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)) applies, the concept of “free and prior informed consent” shall form the basis of the dialogue and negotiations.

Guidance for Implementation

3.1 p-SIAs

The focus of this criterion is on risks and impacts between (surrounding) communities and the farm.

Information as to the farm’s technical operations that have no bearing on risks and impacts outside the farm need not be documented nor disclosed in the participatory processes. Documents and processes can be checked and verified through confidential conversations with participating stakeholders, local government and/or a civil society organisation. This criterion and its underlying methodologies apply to both new farms and existing farms, with minor differences in the attention paid to risks and impacts. Methodologies can vary depending on farm size or farm-group size. More detailed guidelines for farmers and auditors are provided in Appendix IV.

Criterion 3.2 Complaints by affected stakeholders are being resolved

INDICATOR	REQUIREMENT
<p>3.2.1. Farm owners shall develop and apply a verifiable conflict resolution policy for local communities. The policy shall state how conflicts identified in the p-SIA and new complaints will be tracked transparently, how third-party mediation can be part of the process and explain how to respond to all received complaints. Complaint boxes, complaint registers and complaint acknowledgement receipts (in local language(s)) are used.</p>	<p>Completed</p>
<p>3.2.2. Areas of conflict³⁵ or dispute are recorded and shared among farm, local government, and surrounding community representatives. At least 50% of the conflicts shall be resolved within one year from the date of being filed, and a total of 75% in the period between two successive audits.</p>	<p>Completed</p>

Rationale - Mutually fair and open negotiations will help resolve conflicts. The farm must, therefore, have a conflict resolution policy in place that describes how to make/file complaints and an explanation of how the farm intends to address them. The contents of this policy must be known publicly (in surrounding communities), and the farm must

³⁵ **Conflicts:** situations wherein one party perceives hindrance in legitimate interest as caused by the other party's actions or absence of actions. For the purpose of this standard, conflicts exclude complaints made by single individuals unless verified/supported by a community leader or community organization.

allow verification of the progress it makes in resolving outstanding concerns. The Standard allows for the eventuality that not all conflicts can be resolved easily and quickly, and third-party mediation may sometimes be needed. It must also be noted that conflicts may not necessarily be caused by farm development and/or operations, but that the farm shall exercise due diligence³⁶ (i.e., actively seek to determine and solve) with regard to complaints, provide the utmost effort to avoid harming the interests of surrounding communities and provide evidence for this according to the Standard. The process of resolution is documented, and meeting minutes are kept. Minutes include an agenda, the list of concerns raised, resolutions or agreements reached, a list of who shall take what action by when, and a list of participants. Local government and, if available, at least one civil society or customary organization chosen by the community shall have access to the conflict resolution process and the documentation.

Guidance for Implementation

3.2 Conflict resolution

A conflict is deemed resolved if both parties in the negotiation process have agreed to take it off the agenda (in terms of this Standard: if both parties accept external mediation and/or a legal verdict, then the conflict is deemed resolved regardless of whether the mediator or legal decision has been made).

³⁶ **Due diligence:** the effort made by an ordinarily prudent or reasonable party to avoid harm to another party.

Criterion 3.3 Transparency in providing employment opportunities within local communities³⁷

INDICATOR	REQUIREMENT
3.3.1. Farms shall document evidence of advertising positions to people living within daily traveling distance from the farm before hiring people who cannot travel to and from home daily. ³⁸	Proof of dated job opening advertisements in surrounding villages, by means of either/or signposts, billboards or ads in local magazines or newspapers.
3.3.2. Justifications for employment of each worker are available, and based on profile and merits (skills, experience, or CV in the case of hired migrant worker).	Written and dated records of applications and interviews with applicants, including stating whether they are from an outside community or from the local area. Records must also state reasons for successful or unsuccessful applications. Name and contact details of applicants will make verification possible.

Rationale - Unskilled labour is common on crustacean farms; therefore, crustacean aquaculture can be very beneficial to rural village economies as a major source of employment. However, crustacean farmers often hire workers from further away areas and asking them to stay on, or close to, the farm. In doing so, the potential value crustacean farming could have brought to local rural economies is lessened. This criterion is formulated to ensure that the local workforce is duly considered for jobs on the farm and that workers from further away are only hired when the local workforce is

³⁷ Only required for medium and large-scale farms: those who hire more than one permanent worker, non-local worker.

³⁸ Not applicable if farm is found to hire >50% of their staff locally

not interested in that type of job or does not meet job requirements. “Further away” workers, in this context, are hired workers whose living quarters (at the moment of hiring) are further away from the farm than can be reasonably travelled on a daily basis.

Guidance for Implementation

3.3 Providing employment within local communities

Farms that hire most of their workforce from distant areas need to be able to demonstrate that vacancies are first communicated to the surrounding community. The requirement does not pre-determine local hiring but seeks to exclude the possibility that farms avoid hiring people locally if and where suitable workers are available.

Criterion 3.4 Contract farming³⁹ arrangements (if practiced) are fair and transparent to the contract farmer

INDICATOR	REQUIREMENT
3.4.1. Written contract agreements	The contracts are written in an appropriate language ⁴⁰ , and co-signed copies are kept by both parties.
3.4.2. Contract provisions	The contracts comply with the Appendix V (part A) on content of basic provisions to ensure that conditions of the agreement are mutually understood.

³⁹ **Contract farming:** an agricultural production system carried out according to an agreement between a buyer and farmers, which establishes conditions for the production and marketing of a farm product or products (FAO).

⁴⁰ Language that is common to all signing parties. If necessary, contracts must be translated.

<p>3.4.3. Transparency and openness of negotiations</p>	<p>Meetings between the purchaser and the contract farmers to discuss and negotiate agreements are held at least twice a year and documented. Meetings are attended by at least three representatives of the farm group or cooperative. All members contributing to the supply contract must sign their agreement to the negotiated terms.</p>
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Rationale - Contract farming arrangements are increasingly part of the business practices in the aquaculture sector. These arrangements differ from labour contract arrangements in that the contract does not revolve around labour in exchange for wages, but is rather an arrangement between two independent parties that both carry risks by committing to and implementing the contact. In the context of this requirement, contract farming applies to the farm owner/operator either in outsourcing (to another farm) or as a signatory in a contract-farming arrangement with the receiver of the harvest. The concern that the requirement is seeking to address is that contract farming arrangements are open to skewed, unequal and non-transparent arrangements; often the less influential parties are not made fully aware of what they are committing to and sometimes compliance to mutual obligations is enforced by only one party. Three specific indicators are set to ensure that the contracting process is fair and transparent. Appendix V provides more detailed guidance on contract farming arrangements.

PRINCIPLE 4: OPERATE FARMS WITH RESPONSIBLE PRACTICES

Impact: Aquaculture, as any agricultural production system, often requires intensive labour. Many countries have national laws that address labour issues; however, these laws are not consistent in a global context and sometimes fall below internationally agreed-upon standards.

The labour requirements in this document are based on the core principles of the International Labour Organisation (ILO) and other matters on which the UN has agreed are the fundamental right of individuals. Often, in developing countries, workers live on or near the farm in a rural environment lacking good infrastructure and living conditions. The requirements of Principle 4 apply to employees with verbal or written contracts.

The criteria and indicators under this principle apply to all hired workers (temporary and/or permanent; with or without written contract). Conditions for so-called “family workers”⁴¹ must be comparable to those for the formally employed, but the ASC Shrimp Standard recognises a more flexible arrangement between employer and workers⁴² in this case.

⁴¹ **Family worker:** 1st or 2nd degree blood-related to the primary owner or his/her spouse AND receiving his/her compensation or benefits for work done on the farm NOT calculated on the basis of the time he/she works on the farm but proportional to the productivity or profit of the farm (e.g. a son joining his father in the family enterprise, or a 2nd-degree cousin doing work in exchange for accommodation and food, or 2 brothers sharing harvest revenues). First or 2nd degree family members agreeing to do work in exchange of payments on the basis of work-time are considered ‘hired workers’ whether agreements are verbal or on paper.. Workers partially paid according to time/days and partially paid through share in product sales are considered ‘hired workers’.

⁴² **Hired worker/employee:** someone contracted for the duration of a production cycle or longer and receiving monetary compensation in exchange for the time he/she works on the farm. Hired labour, for specific short activities with the maximum duration of two weeks, such as harvesting, is not considered Permanent hired labour.

Criterion 4.1 Child labour and young workers⁴³

INDICATOR	REQUIREMENT
4.1.1. Minimum age of hired workers.	18 years of age.

Rationale - Adherence to the child labour codes and definitions included in this section indicates compliance with what the ILO and related international conventions generally recognise as the key areas for the protection of children⁴⁴ and young workers.⁴⁵ Children and young workers are particularly vulnerable to economic exploitation, due to their inherent age-related limitations in physical development, knowledge, and experience. Children and young workers shall never be exposed to work or working hours that are hazardous to their physical or mental well-being. Work on a crustacea farm is inherently hazardous due to the proximity to water and the risk of contact with dangerous or irritable (chemical) substances. To this end, the requirements related to what constitutes child labour will protect the interests of children and young workers in certified aquaculture operations.

⁴³ **Child labour:** Any work done by a child, which refers to work that: – is mentally, physically, socially or morally dangerous and harmful to children; and – interferes with their schooling by:

- depriving them of the opportunity to attend school; obliging them to leave school prematurely; or
- requiring them to attempt to combine school attendance with excessively long and heavy work..

⁴⁴ **Children:** any persons less than 15 years of age, unless local minimum age law stipulates a higher age for work or mandatory schooling, in which case the higher age would apply. If, however, local minimum age law is set at 14 years of age in accordance with developing country exceptions under ILO Convention 138, the lower age will apply.

⁴⁵ **Young worker:** Any worker older than the basic minimum age for work but younger than 18 (or the age of legal adulthood as defined by national law, if higher). All young workers are classified as children; not all children can be classified as young workers.

Guidance for Implementation

4.1.1: Young workers

The minimum allowable age of permanent workers is 18 years old. This requirement does not apply to farmers’ children who are allowed to work part time, provided they are older than the minimum legal age for work, that the work does not jeopardise school attendance and that they are not involved in hazardous work⁴⁶ (work in proximity of ponds unless constantly supervised by an adult worker capable of swimming, work in proximity of potentially irritable or hazardous substances, heavy lifting disproportionate to a person’s body size, operating heavy machinery and working night shifts).

Criterion 4.2 Forced, bonded, or compulsory labour ⁴⁷,

INDICATOR	REQUIREMENT
4.2.1. Right to full final payment and benefits.	Employers will not withhold any part of employee salary, property, or benefits upon the termination of employment.
4.2.2. Employees have the right to keep identity documents and work permits.	Hired workers are not required to surrender original identity documents with their employer upon commencing employment.

⁴⁶ **Hazardous work:** work which, by its nature or circumstances in which it is carried out, is likely to harm the health, safety or morale of employees, especially if specific skills, experience, or preventative measures are not in place. This includes for example heavy lifting disproportionate to a person’s body size, operating heavy machinery, exposure to toxic chemicals. Hazardous work is one example of the worst forms of child labour.

⁴⁷ **Forced, bonded and compulsory labour:** all work or service that is extracted from any person under the menace of any penalty for which said person has not offered him/herself voluntarily or for which such work or service is demanded as a means of repayment of debt.

4.2.3. Hired workers have the freedom of movement outside working hours.	Hired workers shall be free to leave the workplace and manage their resting time.
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Rationale - Forced labour, such as slavery, debt bondage and human trafficking, is a serious concern in many industries and regions of the world. Ensuring that contracts are clearly articulated and understood by hired workers is critical in determining that labour is not forced. The inability of a worker to freely leave the workplace and/or an employer withholding original identity documents of workers are indicators that employment may not be at will. Hired workers⁴⁸ shall always be permitted to leave the workplace and manage their own time. Employers⁴⁹ are never permitted to withhold original worker identity documents. Adherence to these policies shall indicate that an aquaculture operation is not using forced, bonded, or compulsory labour forces.

Guidance for Implementation

4.2.1: Forced, bonded or compulsory labour

Contracts shall be clearly stated and understood by hired workers and never lead to a hired worker being indebted. Salary or part of salary shall not be withheld for payment of goods and services made obligatory by the employer. Accommodation, clothing, food, transport, etc., if the employer makes use of these goods and services as an obligation, are then provided for above the salary stated in the contract. Job-training programs required by the employer are fully paid for or reimbursed by the employer. All payments shall be settled at job termination. The employer shall never be permitted to withhold or retain a hired worker's original identity documents. Extra care shall be given to migrants and contractor/subcontractor situations, as they can be particularly vulnerable without their identity documents. This indicator refers to the right of the worker to choose where he/she will spend his/her free time. The indicator does not dictate that workers should leave the farm. In many situations (e.g., remote farms) workers may wish to stay on or near the farm out of convenience.

⁴⁹ **Employer:** Employers are those workers who, working on their own account or with one or a few partners, hold the type of job defined as a self-employed job, and in this capacity, on a continuous basis (including the reference period) have engaged one or more persons to work for them in their business as hired workers.

Criterion 4.3 Discrimination⁵⁰ in the work environment

INDICATOR	REQUIREMENT
<p>4.3.1. Anti-discrimination policy in place, which includes, but is not limited to, how to deal with discrimination in the workplace, equal access to all jobs regardless of gender, age, origin (locals vs. migrants), race or religion, outlines clear and transparent company procedures to raise, file, and respond to discrimination complaints. Clear and transparent company procedures are outlined to raise, file, and respond to discrimination complaints.</p>	<p>Policy document is available on farm and its content is known by workers. Evidence that the procedures are in place and being used. No complaints from workers as to adherence to it.</p>
<p>4.3.2. Number of incidences of discrimination</p>	<p>None</p>
<p>4.3.3. Equality of salaries and opportunities. All hired workers, independent of their gender, origin, race or religion, receive equal pay, benefits, promotion opportunities, job security arrangements and training opportunities for equal work at equal role and experience levels within the same hierarchical position.</p>	<p>Evidence of equality of salaries and opportunities.</p>

⁵⁰ **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 favour of people from certain underrepresented groups may be legal in some countries.

4.3.4. Respect of maternity rights and benefits.	Employers shall not test for pregnancy, shall not sanction and/or dismiss on basis of marital status, and shall guarantee legal rights to pregnancy/maternity leave.
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Rationale - Unequal treatment of hired workers, based on certain characteristics (such as sex or race), is a violation of 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. 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 and 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 a minimisation of discrimination. Differences in quality of work between equal workers can be rewarded through discretionary bonus payments on top of a regular salary.

Guidance for Implementation

4.3.1: Discrimination in the work environment

Evidence of anti-discrimination policies/practices

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 discrimination incidence

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 4.4 Work environment health and safety

INDICATOR	REQUIREMENT
<p>4.4.1. Percentage of worker trained in health and safety practices, procedures, and policies relevant to the job. Safety equipment provided and maintained and in use.</p>	<p>100% of workers trained. Certificates of training issued by the relevant competent national or provincial authority or by such an authority-recognised training centre are required for operations with more than five employees.</p>
<p>4.4.2. Monitoring of accident and incidents and corrective actions.</p>	<p>All job-related accidents and incidents must be recorded, and corrective actions must be documented and implemented.</p>
<p>4.4.3. Medical expenses coverage.</p>	<p>Employer must provide proof of coverage of all expenses related to any accident/injury occurring under the responsibility of the employer when not covered under national law.</p>

Rationale - A safe and healthy working environment is essential for protecting workers from harm. Consistent and effective worker training in health and safety practices are an important preventative measure, as is providing workers with proper equipment for the

job. 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. These requirements address violations and long-term health and safety risks. Finally, while many national laws require that employers assume responsibility for job-related accidents/injuries, not all countries require this and not all workers (e.g., migrants, and other workers) will be covered under such laws. When not covered under national law, employers must prove they are insured to cover 100% of worker costs in a job-related accident or injury.

Guidance for Implementation

4.4.1: Work environment health and safety

There must be evidence that all farm workers have been fully trained. If interviewed, workers need to exhibit knowledge and understanding of safety hazards⁵¹ and safety practices.

Minimisation of hazards/risks in the working environment, including documented systemic procedures and policies to prevent workplace hazards and their risks, shall exist and the information shall be available to the workers.

Emergency response procedures shall exist and be known by workers. Warning signs in the appropriate language or with easy-to-understand pictures shall be used around hazardous equipment and/or chemical substances.

All workers shall have the right to remove themselves from danger without seeking permission from the company.

Farms must offer regular health and safety training for hired workers (once a year and for all new workers), including training on potential hazards and risk minimisation.

4.4.2: Determining occurrences of health and safety-related accidents, violations recorded, and corrective actions taken

At a minimum, all job-related accidents that require some form of professional medical attention (nurse or doctor) shall be recorded. Documentation shall be generated regarding occupational health and safety violations. The recommendation is to include records of the number of incidents and the number of man-days lost due to incidents.

⁵¹ **Hazard:** the potential for harm (physical or mental). In practical terms, a hazard is often associated with a condition or activity that, if left uncontrolled, can result in an injury or illness. Identifying hazards and eliminating or controlling them as early as possible will help prevent injuries and illnesses (OSHA).

A corrective action plan shall be implemented in response to job-related accidents and violations of safety practices that have occurred. This needs to analyse and address the root causes and remediate and prevent future risks or accidents of a similar nature.

4.4.3: Proof of accident coverage

There shall be sufficient compensation to cover expenses and income losses for all hired workers who suffer from accidents or injuries that take place in the work environment. Special consideration must be given to temporary, migrant, or foreign workers who may fall outside of laws relevant to protection in case of job-related injuries or health issues. Documents pertaining to worker insurance can be verified with the indicated insurance company.

Criterion 4.5 Minimum and fair wages or decent wages⁵²

INDICATOR	REQUIREMENT
4.5.1. Minimum wage level as applicable to their specific job/task description.	All hired workers, including temporary workers ⁵³ , must receive pay greater than or equal to legally set minimum wage according to country or region in country (whichever applies). Payments must

⁵² **Fair or decent wages:** a wage level that enables workers to support an average sized family above the poverty line. Basic needs include essential expenses such as food, clean water, clothes, shelter, transport, education, obligatory taxes, plus a discretionary income, as well as legally mandated social benefits (which may include health care medical insurance, unemployment insurance, retirement, etc). OECD countries define 50% of median-level income in a given country as the minimum income that provide such basic needs. In cases where harvest- or profit-sharing arrangements are used between those who own the farm and those who are employed to work on the farm, the financial value of legal minimum wage or 50% of median wage-level in country (whichever is highest) needs to be guaranteed income of the employee regardless of farm performance. The concept differs from the concept of legal minimum wage. Thus, the calculation of fair or decent wage is to be done, regardless of the establishment of a legal minimum wage.

⁵³ **Temporary worker:** Workers whose main job is an occasional, casual, or seasonal worker; daily workers, works seasonal or temporary under contract with duration of less than 12 months. In case of re-hiring the same worker: if the total of the two hiring periods, irrespective of the time between hiring periods, goes beyond 12 months total (including, if any, probation periods), then the worker is a permanent one.

	<p>be made: in legal tender, at the workplace or in the worker’s bank account, at the frequency specified in the contract, with clearly documented pay slips given to workers, including identification of any deductions, advanced payments and/or agreed contributions.</p>
<p>4.5.2. Permanent workers are paid fair wages. Salaries, if not already at a “fair wage” level, are gradually increased to include sufficient funds for a worker’s basic needs plus a discretionary income that allows for savings and/or pension payments.</p>	<p>Evidence available confirming fair wages or gradual pay rises through time-series of pay slips in farm administration and in the hands of workers.</p>
<p>4.5.3. Punishment through infringement of workers’ rights or wages.</p>	<p>No allowance for withholding any part or all of worker salaries, benefits or rights acquired or stipulated by law, even as punishment of alleged wrongdoings on the part of the worker</p>
<p>4.5.4. There is a mechanism for setting wages and benefits (including, if applicable, the combination of pay and harvest workers. Sharing arrangements).</p>	<p>Decision-making criteria and processes for wage and benefit adjustments are known by all workers</p>
<p>4.5.5. Revolving labour-contract schemes designed to deny long-time workers full access to fair and equitable remuneration and other benefits.</p>	<p>Prohibited.</p>

Rationale - Workers shall be paid wages that, at a minimum, meet the legal minimum wage. Progress shall be made toward meeting the need for a surplus discretionary income (through work policies, contract specifications or negotiations). Certified aquaculture operations shall demonstrate their commitment to fair and equitable wages by having and sharing a clear and transparent mechanism for wage setting and a labour conflict-resolution policy that tracks wage-related complaints and responses. It is important that wages do not go below a measure of current spending power for the country in which the farm is operating. Unfairly compensated workers can be subject to a life of sustained poverty. Company policies and practices shall also prohibit deductions in pay for disciplinary actions and ensure that the payments are made in a manner that is convenient to workers. Having these policies outlined clearly and transparently will empower workers to negotiate effectively for fair and equitable wages that will, at a minimum, satisfy basic needs and a discretionary surplus. Revolving labour-contract schemes designed to deny long-time workers full access to fair and equitable remuneration and other benefits are prohibited.

Guidance for Implementation

4.5.2: Fair and decent wages

Employers shall ensure that wages paid for a standard working week (no more than 48 hours - see Criteria 4.8), at a minimum, allow for a decent level of spending power as prevalent within the country of operation. Employers must provide sufficient income to workers to ensure that their basic needs are met. Farms are certifiable when salaries are in accordance with legally defined minimum wage levels for the region in which the farm is located. Subsequently, a policy or process needs to be in place that allows a gradual increase above minimum wage levels. Farms will hold and keep certificates, in subsequent audits, when audits reveal progress in wages above initial minimum wage levels. There are no deductions in pay and/or benefits for disciplinary actions. Wages and benefits are clearly articulated to workers and are rendered to workers in a convenient manner. Workers do not need to travel to collect benefits. Promissory notes, coupons or merchandise never replace cash/electronic/check payment methods. Workers are given wage payslips on paper, indicating the actual amounts paid and clearly listing any deductions or advances. Worker contribution, if any, to accommodation, food, services for workers (e.g., schooling for children) are transparently reflected on the payslip or proof of payment. Worker contributions such as salary deductions are strictly voluntary in the sense that the worker has the right to choose not to avail him or herself of these services and thus receive full payment in wages.

False Apprenticeship Scheme: the practice of hiring workers under apprenticeship terms without stipulating terms of the apprenticeship or wages under contract. It is a “false” apprenticeship if its purpose is to underpay people, avoid legal obligations or employ children.

Labour-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.

In case of payments per piece or per hour, the net benefits the worker takes home shall minimally be pro-rated based on the above.

Payments based on farm performance (harvest share or bonus) occur in crustacean aquaculture. Any bonuses farm workers can reliably count on can be considered part of their wages and can be included. Bonuses that are not assured and are dependent on farm or pond performance are not considered part of the wage of a worker. Risk-sharing arrangements above minimum wage assurances are considered in compliance with the ASC Shrimp Standard.

Criterion 4.6 Access to freedom of association and the right to collective bargaining

INDICATOR	REQUIREMENT
<p>4.6.1. Percentage of workers with access to trade unions, worker organisations, and/or can self-organise and the ability to bargain collectively⁵⁴ or to have access to representative(s) chosen by workers without management interference.</p>	<p>100% of workers have access, if they so choose, to worker organisations capable of representing them independently from the employer.</p>
<p>4.6.2. Members of unions or worker organisations are not discriminated against by employers.</p>	<p>Employers shall not interfere with or penalise workers for exercising their right of representation.</p>

Rationale - Having the freedom to associate and bargain collectively is a critical right of workers, because it allows workers to have a more balanced power relationship with employers when doing such things as negotiating fair compensation. This does not mean that all workers at a certified aquaculture operation must be in a trade union or similar organisation, but no workers will be prohibited from accessing such organisations 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 freely elected or freely chosen by workers.

Guidance for Implementation

4.6.1: Freedom of association and collective bargaining

⁵⁴ **Bargain collectively:** voluntary negotiation between employers and organizations of workers in order to establish the terms and conditions of employment by means of collective (written) agreements

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

Companies shall ensure that workers interested in collective bargaining or joining a union or worker organisation of their choice are not subjected to discrimination. When rights are restricted, the company should make it clear to workers that they are willing to engage workers in collective dialogue through a representative structure and that they will allow workers to freely elect or choose their own representatives.

Workers have the freedom to form and join any trade union or worker organisation permitted by the laws of the country, free of any form of interference from employers or competing organisations set up or backed by the employer. The ILO specifically prohibits “acts which are designated to promote the establishment of worker organisations or to support worker organisations by financial or other means, with the object of placing such organisations under the control of employers or employers’ organisations” (ILO, 1949 Article 2).

Evidence provided will be cross-checked with the indicated union or by the organisation chosen by the worker.

Criterion 4.7 Harassment and disciplinary practices in the working environment causing temporary or permanent physical and/or mental harm

INDICATOR	REQUIREMENT
4.7.1. Fairness of disciplinary measures.	No instances of abuses. ⁵⁵
4.7.2. Clear, fair, and transparent disciplinary policies and procedures.	Evidence of documentation and communication to all workers.
4.7.3. Prohibition of harassment.	Evidence that any instances have been addressed and resolved.

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 worker. A certified aquaculture operation shall never employ threatening, humiliating or punishing disciplinary practices that negatively impact a worker's physical and/or mental health or dignity. Employers that support non-abusive disciplinary practices accompanied by evidence from worker testimony shall indicate compliance with this requirement.

Guidance for Implementation

4.7.1: Disciplinary actions in the work environment

Determining incidences of abusive disciplinary actions

⁵⁵ Physical or mental.

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 made as a method for disciplining workers, as confirmed by policy statements and worker testimony.

Evidence of non-abusive disciplinary policies and procedures

If disciplinary action is required, progressive verbal and written warnings shall be used. The aim should always be on improving the worker before letting him or her go, as indicated by policy statements and evidence from worker testimony.

Criterion 4.8 Overtime compensation and working hours

INDICATOR	REQUIREMENT
<p>4.8.1. Maximum number of regular working hours: 8 hours/day or 48 hours/week (maximum average over 17-week period) including “stand-by” hours; with at least one full day (including two nights) off in every seven-day period.</p>	<p>Reflected in records available on the farm and 100% compliance expressed in worker interviews.</p>
<p>4.8.2. Right to leave the farm after completion of daily work duties.</p>	<p>Evidence of freedom of movement for all employees.</p>
<p>4.8.3. Minimum time off from work, with the right but not the obligation to leave farm premises if accommodations are on the farm, except where both the employer and employee agree that off-days cannot be accommodated on the farm.</p>	<p>Four full 24-hour periods per month.</p>
<p>4.8.4. Transport provided to workers (in cases where farm locations are remote) to allow workers to enjoy relaxation at home, with family or in places of recreation.</p>	<p>The farm owner shall provide transport to and from the first location from which regular public transport is available.</p>
<p>4.8.5. Overtime compensation is provided.</p>	<p>Paid at a premium rate of at least 25% above the wage for normal hours.</p>

<p>4.8.6. Overtime is voluntary, and not longer than 12 hours/week.</p>	<p>Occasionally (not on a regular basis).</p>
<p>4.8.7. Rights to maternity leave, including daily breaks or a reduction of hours of work to address childcare needs.</p>	<p>Maternity leave is a minimum of 14 weeks (total period off-duty period including before and/or after moment of birth) and includes a guarantee to return to the job. Payment during this period shall minimally be at the level of social insurance offered by the country.</p>

Rationale - Abuse of overtime working hours is a widespread issue in many industries and regions. Workers subject to extensive overtime can suffer consequences in their work-life balance and are subject to higher fatigue-related accident rates. In accordance with better practices, employees in certified aquaculture operations are permitted to work, - within defined guidelines, - beyond normal work week hours but must be compensated at premium rates. Requirements for time off, working hours and compensation rates as described should reduce the impacts of overtime. Maternity rights are based on ILO convention 183 (ILO, 2000) (Criterion 4.8.7). Crustacean farming often involves long periods of stand-by labour (e.g., watching culture performance during the night; being on stand-by duty in case mishaps must be corrected quickly, etc.). This makes criteria on overtime and stand-by duties necessary in this requirement.

Guidance for Implementation

It is recommended that the provisions of Criterion 8 find a place in the employment contract so that workers are made aware of time-related requests on them and know where the boundaries are in such requests.

4.8.1: Overtime and working hours

Determining incidences, violations and abuse of working hours and overtime

Hours worked include time spent at the workplace on productive activities and on other activities that are part of the tasks and duties of the jobs concerned (e.g., cleaning and

preparing working tools). It also includes time spent at the workplace when the person is inactive for reasons linked to the production process or work organisation (e.g., stand-by time), as paid workers remain at the disposal of their employer during these periods. Hours worked also include short rest periods spent at the workplace because they are difficult to distinguish separately, even if workers are not “at the disposal” of their employer during those periods. Explicitly excluded are lunch breaks, as they are normally sufficiently long to be easily distinguished from work periods.

The employer shall comply with applicable laws and industry standards related to working hours. A “normal work week” can be defined by law but shall not, on a regular basis (constantly or most of the time), exceed 48 hours. Variations based on seasonality may apply. Farms are encouraged to keep work-time records.

Personnel shall be provided with at least one full day (including two nights) off in every seven-day period during which they shall not be denied permission to leave farm premises. Workers are not obliged to leave the farm during off-time but have the right to do so if they wish. Where farm locations are too remote to allow workers to enjoy relaxation at home, with family or in places of recreation of their choosing, the farm owner shall provide transport (both ways) and enough time off to allow workers such enjoyment at least once every 17 weeks.

Workers will not be discouraged from keeping work-time records (in cases when the farm does not do so itself).

Overtime shall not exceed 12 hours per week for more than two consecutive weeks, and total work time (including overtime) shall not exceed 60 hours on average over a 17-week period. All overtime shall be paid at a premium of minimally +25% over regular wage. Overtime work shall be voluntary, except in cases where overtime is necessary to meet short-term business demands, as long as it is legal and there is a collective bargaining agreement in place that addresses this issue.

In accordance with ILO convention C-183, protection is given to women before and just after childbirth. Women in these situations are not obliged to perform work that could endanger the health of both mother and/or child. Pregnancy or infant childcare shall never be a reason to terminate the employment and the burden of proof in cases of dismissal lies with the employer. Cash benefits during pregnancy and/or infant childcare shall minimally be at the level of in-country prevalent social minima provided by the government in accordance with laws and regulations pertaining to sickness, unemployment and/or (temporary) disability. When seeking employment, women shall not be subject to pregnancy tests or required to submit certificates of such a test except where required by national laws or regulations.

Criterion 4.9 Worker contracts are fair and transparent

INDICATOR	REQUIREMENT
<p>4.9.1. Allowance for labour-only contracting⁵⁶ relationships or false apprenticeship schemes including revolving/consecutive labour contracts to deny benefit accrual.</p>	None
<p>4.9.2. All workers have the appropriate and applicable permits for working in the country.</p>	Employer has a list of permit reference numbers or copies of permits for all concerned workers.
<p>4.9.3. Workers are fully aware of their employment conditions and confirmed their agreement (verbal or written). Written employment policies and procedures are required when there are more than five hired workers.</p>	Evidence of contract agreement for all workers. <u>Written</u> contracts: a complete contract is filed in the office, mutually signed and copies are available to the worker. <u>Verbal</u> agreements: employer and worker cite consistent employment conditions in independent interviews.
<p>4.9.4. Probation period stipulated in contract.</p>	The probation period shall follow prevalent law in the country, but not be more than 30 days in cases laws do not exist or are not applicable.

⁵⁶ **Labour only contracting:** 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 protection.

<p>4.9.5. In subcontracting⁵⁷ or home- working arrangements, the farm owner shall assure that labour laws, social security laws is filed in the office, mutually signed and ratified ILO provisions have been duly respected and complied with.</p>	<p>Confirmation that sub-contractors and intermediaries have contracts with their workers that are in accordance with rules and regulations.</p>
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Rationale - The key to a fair and transparent exchange (work for income) is an agreement that is clear to both parties and can be verified during the contract period. Signed documents (by both parties) that both parties have access to at will are important for verification to take place. This will also ensure that conflicts around misunderstandings can be avoided and, if they do occur, can be discussed in a mutually transparent manner. Where verbal contracts are practiced (e.g., remote rural locations, cases of illiteracy and small family farms) or with less than five workers, extra care must be taken to ensure that the contents of the agreement are fully agreed to and well understood by both parties.

Guidance for Implementation

4.9.3: Worker contracts are fair and transparent

Contracts include provisions on: date of entry, notice period, probation period, salary and salary policy, expected working hours, policies on overtime, farm safety protocols, terms of insurance, policies on disciplinary measures, list of obligatory expenses, other specific rights and obligations of both parties, both signatures (with clearly typed or written names and addresses) and date of signing. The general or collective provisions may be annexed to the signed contract, but the worker shall have a full printed copy of those.

Farms with more than five hired workers shall follow formalised paper-based contract and policy procedures. On farms with fewer workers, where farmers and workers engage in verbal contracting practices, confidential interviews with the farm owner, worker(s) and the surrounding community (e.g., a local schoolteacher, in the event of children

⁵⁷ **Sub-contracted worker:** not directly contracted by farm but through an intermediary party.

working on the farm) may be necessary to validate whether fair and transparent (i.e., verbal) contracting is taking place.

Cooperatives (groups of farms) amounting to in total more than five hired workers will comply with the paperwork that is specified in the indicators.

4.9.5: Sub-contracting and home-working arrangements

Sub-contracting crews for specific labour-intensive tasks (e.g., harvesting, sorting) is common practice in crustacean aquaculture but often a sparsely or non-regulated part of the business. Through sub-contracting, such services on farms may unwittingly become associated with labour issues that may exist in this sparsely regulated part of the industry. Farms take an appropriate measure of social responsibility by exercising due diligence before hiring the services of a specific provider. This due diligence is incorporated in this requirement by farmers showing evidence that they have screened service providers on possible violations of basic worker rights.

Criterion 4.10 Fair and transparent worker management systems⁵⁸

INDICATOR	REQUIREMENT
4.10.1. The employer ensures that all workers have access to appropriate channels of communication with managers on matters relating to labour rights and working conditions.	Management and the full workforce meet at least twice per year based on with written agendas and minutes of the meetings made available.
4.10.2. Percentage of issues raised by workers which are recorded responded to and monitored by employer.	100%
4.10.3. Clear plan, with process actions and timeframe, is developed to address complaints, and complied with.	List of complaints, corresponding action plan and timeframe for resolution is available.
4.10.4. Percentage of complaints that are resolved within three months after being received.	90%, according to the timeframe of 4.10.3.

Rationale - Besides a bilateral relationship between employer and worker, there is also a collective relationship between the farm management and the group of workers. Collective meetings must take place regularly when there are more than five workers to create a venue and time to discuss collective concerns. Such concerns can be directed from management to workers, but also from workers to management. Prepared

⁵⁸ Applicable to farms with more than 5 workers.

meetings based on a prepared and communicated agenda, with minutes and the outcome on paper, will allow a structured process of negotiation and group cohesion building. Regular, collective meetings will improve the effectiveness and efficiency of the work done on the farm and will also ensure greater job satisfaction.

Guidance for Implementation

4.10 Fair and transparent mechanism to resolve collective conflicts

Records of the meetings can be inspected and verified with management, workers, and the union or another organisation of which a worker is a member. The minutes shall include the agenda, the resolution or action points upon which both parties agreed and a list of meeting participants.

Criterion 4.11 Living conditions for workers accommodated on the farm

INDICATOR	REQUIREMENT
4.11.1 Living conditions for workers accommodated on the farm are decent and safe.	All facilities are clean, sanitary, rainproof, safe, and suitable for habitation. Shared quarters need to include provisions that allow for privacy, such as walls, curtains, or movable screens. Potable water and cooking facilities or catering facilities are available to all accommodated workers on the farm premises.
4.11.2 Adequate facilities for women. ⁵⁹	Separate and suitable sanitary and toilet facilities are available for men and women, with the possible exception of married couples being accommodated together.

Rationale - The protection of the workers that reside or live on the farm's property is an integral part of the employer's responsibility. To maintain the health and performance of workers, farms will provide clean, sanitary, and safe living quarters with access to clean water and nutritious meals. Accommodation facilities must provide for the needs of those (presumably, but not exclusively, women) who can be considered at risk of sexual or privacy harassment.

Guidance for Implementation

⁵⁹ Applicable to farms with more than 5 workers

This criterion is about providing resident workers with basic but decent amenities for life. The criterion is not intended for makeshift shelters used on farms to allow workers to occasionally shelter from rain or take a quick nap in between shifts. The living conditions are for permanent or semi-permanent eating, sleeping, resting, indoor recreation and personal hygienic care. International labour codes (ILO, SA8000) also reference the availability of light, and the minimum private space per person of 4 m² in shared sleeping quarters.

PRINCIPLE 5: MANAGE CRUSTACEA HEALTH AND WELFARE IN A RESPONSIBLE MANNER

Impact: The culture of crustacea under stressful conditions can lead to the transfer of pathogens or the amplification of pathogens in the receiving waters. Additionally, heavy reliance on therapeutic chemicals at crustacean aquaculture facilities can cause pollution and can lead to the presence of antibiotic resistant bacteria into the receiving waters, potentially having a negative effect on the local ecosystem.

Criterion 5.1 Disease prevention

INDICATOR	REQUIREMENT
<p>5.1.1. Develop and maintain an operational health plan addressing:</p> <ul style="list-style-type: none"> 1) Pathogens that can come from the surrounding environment into the farm (e.g., predator and vector control) 2) Pathogens that can spread from the farm to the surrounding environment (e.g., effluent filtration/sterilization, and waste such as dead-shrimp management) 3) Spreading of pathogens within the farm. Critical to avoid cross contamination, detect and prevent emerging pathogens, and monitor external signs of pathologies and moribund animals. 	<p>Demonstration that the operational health plan is functional.</p>

<p>5.1.2. Filtration of inlet water for minimising the entry of pathogens.</p>	<p>Nets, grills, screens, or barriers of the appropriate mesh size are present on all farm or pond inlets.</p>
<p>5.1.3. Annual average farm survival rate (SR):⁶⁰</p> <ul style="list-style-type: none"> 1) Unfed and non-permanently aerated pond systems 2) Fed but non-permanently aerated pond⁶¹ systems 3) Fed and permanently aerated pond systems 	<p>SR >25%</p> <p>SR >45%</p> <p>SR >65%</p>

⁶⁰ Survival rate does not include hatchery survival.

⁶¹ Permanent aeration refers to aeration capacity installed during more than 90% of the grow-out period for sustaining a high biomass that exceeds the natural carrying capacity of the culture system and for feeding at the corresponding rate to ensure the best possible growth rate. Emergency aeration is not considered as permanent aeration.

<p>5.1.4. Percent of stocked post larvae (PLs) that are Specific Pathogen Free (SPF)⁶² or Specific Pathogen Resistant (SPR)⁶³ for all important pathogens.⁶⁴</p>	<p>100% if commercially available⁶⁵, i.e., if for any given species, at least 20% of the PLs stocked in the country are from SPF or SPR stocks, then the supply is deemed commercially available. If not commercially available, PLs screened for all important pathogens can be used.⁶⁶</p>
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Rationale - Prevention of disease is the absolute priority for this principle and the ASC Shrimp Standard emphasises the importance of implementing biosecurity measures to reduce the risk of disease at the farm, regional, national, and international levels. At the farm level, biosecurity measures include controlling the inputs (e.g., water, feed and PLs) and disease vectors (e.g., birds and crabs), and taking action to reduce the stress levels of the farm animals (e.g., good pond condition and adequate feed). The ASC Shrimp Standard mandates a health plan that ensures the adequate identification of potential disease risks, appropriate screening and disease prevention measures, effective adaptive measures, and pathways to continuous improvement. It is important to note that the ASC Shrimp Standard does not specifically address food safety issues, should be covered through either international or national legislation (refer to Principle 1) and, if

⁶² **Specific Pathogen Free:** a term used for animals that are guaranteed free of particular pathogens. The certified stock claim is accompanied by a list of the absent pathogens.

⁶³ **Specific Pathogen Resistant** describes a genetic trait of a crustacea that confers some resistance against one specific pathogen. SPR crustacea usually result from a specific breeding program designed to increase resistance to a particular virus. Within these standards, programs using a “mass selection” approach (e.g., taking all the survivors from a pond) are acceptable, provided the “resistant” status of the stock can be scientifically demonstrated.

⁶⁴ All diseases, for which the species farmed is susceptible, listed by the OIE or the national competent authority.

⁶⁵ See Appendix for details on exceptions and SPR/ SPF eligibility.

⁶⁶ For non SPF or non-SPR seed to meet this Standard, all World Organization for Animal Health (OIE) - listed diseases have to be tested for to prove the seed is clean, unless there is clear, scientifically based evidence that the country is free of that disease, or that the species reared by the farmer is not sensitive to that particular disease.

necessary, through other certifications that focus on this aspect, such as the International Food Standard (IFS), the British Retail Consortium (BRC), ISO 22000 or GlobalGAP.

To reduce the use of antibiotics and pesticides, the ASC Shrimp Standard promotes the use of mechanical water filtration to eliminate pathogen carriers and competitors. Mechanical filtration can take place at different levels on the farm (e.g., pumping station, canal, or pond), depending on the farm design, and by different means (e.g., drum filters and inlet filters). Mesh size must be determined based on the risks associated with the production system being used (e.g., presence, likely vectors, etc.).

The proposed survival rates serve as a good performance-based indicator for successful disease prevention; in addition, because survival depends upon different factors (e.g., water quality, feeding and pond size), these indicators also indirectly address management practices, which if followed, should result in consistent survival rates among ponds. The survival rate includes ponds that are discarded due to disease outbreaks in order to estimate the farm survival rate.

The level of control over pond conditions, which partly determines the prevention of diseases, varies greatly based on the culture system, especially when differences in feeding and aeration practices are considered. Therefore, there are three different requirements for survival rates, depending on whether ponds are fed and aerated. Unfed and non-aerated ponds are normally low-density, very large (>50 hectares) ponds where farmers have limited means of controlling conditions and preventing mortalities. Fed but non-aerated ponds allow for a higher level of control but are still susceptible to oxygen crises. Farmers who use continuous aeration usually operate small ponds (<5 hectares) that are more manageable for ensuring optimum conditions for mortality prevention.

One of the main biosecurity measures that can be taken by farm management is to ensure that animals stocked in ponds are free of disease. The ASC Shrimp Standard supports the use of Specific Pathogen Free (SPF) and Specific Pathogen Resistant (SPR) post larvae to achieve this goal. In countries where SPF or SPR seed is not commercially available (i.e., less than 20% of the country's production of any given species uses SPF or SPR stocks), a seed that has been tested for a specific disease may be used. The testing must include country-specific diseases of concern and any on national lists. The ASC Shrimp Standard recognises that checking broodstock in Asia may be challenging, but ASC expects to see continuous improvement of farmers certified under this Standard.

The ASC Shrimp Standard acknowledges that having a screened broodstock coming from the wild or unsecured ponds is not equivalent to SPF. Firstly, one

screening, regardless of the sensitivity of the test, is not equivalent to repeated screenings over several generations for each pathogen considered. There are still several examples of infections developing via post larvae produced by breeders who have only been tested once. An SPF source, when well-managed, can be 100% safe for preventing known pathogens through the stocking of seed. Secondly, all emerging pathogens can come from wild broodstock or unsecured ponds, as many stakeholders, farmers, hatcheries, broodstock suppliers, government officials do not have the necessary tools to detect these diseases; in other words, the probability of introducing a novel disease is much higher. Therefore, screened seed or broodstock is clearly better than nothing, and is preferred to a non-checked seed or broodstock.

Guidance for Implementation

5.1.1: The auditor must be able to understand the rationale for the components of the health plan and understand the risks associated with the farming operation and how the farm plans to continuously improve production practices to address these measures. The auditor needs to be assured that the farm is not contaminating or spreading disease to the surrounding environment, has enacted good prevention measures adapted to the localised risks and has mechanisms to prevent the spread of infections from one pond to another. For example, if a small-scale farm, upon experiencing mortality events likely to be caused by white spot disease (WSD e.g., as determined using gross signs and/or quick pond-side tests), does not discharge water to the natural environment, it would comply with this requirement. In areas where access to diagnostic capacity is limited, gross signs can be used to perform diagnoses.

5.1.2: Screen size must be justified according to the local risk factors.

5.1.3: Survival Rate (SR) Calculation from stocking to harvest see Appendix VI.

Criterion 5.2 Predator⁶⁷ control

INDICATOR	REQUIREMENT
<p>5.2.1. Allowance for intentional lethal predator control⁶⁸ of any protected, threatened, or endangered species as defined by the International Union for Conservation of Nature (IUCN) Red List⁶⁹ national listing processes,⁷⁰ or other official lists.</p>	<p>None</p>
<p>5.2.2. Allowance for use of lead shot and select chemicals for predator control.</p>	<p>None</p>
<p>5.2.3. In case lethal predator control is used, a basic monitoring program must be in place for documenting the frequency of visits, variety of species and number of animals interacting with the farm.</p>	<p>Yes</p>

Rationale - The predation of cultured crustacea by fish, birds, amphibians, reptiles, and other crustaceans can result in significant negative economic impacts to farmers through loss of stock or the introduction of disease. In some cases, farmers employ lethal control to deter or remove predators from their farms. The killing of predators can negatively impact predator populations and affect local biodiversity.

⁶⁷ **Predator:** Any animal that lives by preying on other animals.

⁶⁸ Does not apply to pond water treatment and any aquatic animals that are contained within it.

⁶⁹ www.iucnredlist.org.

⁷⁰ **National listing process:** Any process that occurs at the national, provincial, state, or other level within-country that evaluates species conservation status against a set of defined criteria recognized by relevant governance. Such listing processes may be legally binding (e.g., Endangered Species Act in the U.S.A. or the Species at Risk Act in Canada) or may not be legally binding. (e.g., species listings created by COSEWIC in Canada (Committee on the Status of Endangered Wildlife), or the Red Data Book in Vietnam).

The ShAD determined that the intentional killing or harassment of protected, threatened, or endangered animals that prey on cultured crustacea is inappropriate for farms certified under this Standard.

Any lethal control must be exercised without the use of lead shot, as this has been found to have negative environmental impacts. Furthermore, farmers are not permitted to kill any species that are defined as protected, threatened, or endangered by the IUCN Red List or state, local or national governments.

Farms must demonstrate that they have exhausted non-lethal options before lethal control is employed. Documentation must be provided to the auditor explaining the exceptional circumstances that led to the lethal control.

Guidance for Implementation

5.2.1: This requirement does not apply to pond water treatment. Intentional lethal predator control is defined as actively trying to kill an animal. The use of passive predator exclusion fences and devices is strongly encouraged.

5.2.2: Only chemicals registered in the country of production can be used. Additionally, the use of pesticides must be compliant with the requirements of 5.3.5.

5.2.3: The monitoring must provide evidence that a non-protected, non-threatened species has become a pest, and/or are damaging other more fragile species by invading their biotope. The results shall be validated by a governmental agency.

Criterion 5.3 Disease management and treatment

INDICATOR	REQUIREMENT
5.3.1. Allowance for use of antibiotic and medicated feed on ASC-labelled products (farm can be certified but specific product receiving medicated feed will not be authorised to carry ASC label).	None
5.3.2. Allowance for the use of antibiotics categorised as critically important by the World Health Organization (WHO, 2019), even if authorised by the pertinent national authorities.	None
5.3.3. Information on chemical storage and usage.	Records of stocks and usage are available for all products.
5.3.4. Proper use of chemical products by farm workers.	Evidence of worker awareness/training and instructions are available.
5.3.5. Allowance for treating water with pesticides banned or restricted by the Rotterdam Convention on Prior Informed Consent (PIC; UNEP 2004), the Stockholm Convention on Persistent Organic Pollutants (POPs; UNEP 2019) or classed as “extremely hazardous” or “highly hazardous” (classes Ia and Ib) by the World Health Organization (WHO).	None

5.3.6. Allowance for discharge of any hazardous chemicals without previous neutralisation.	None
5.3.7. Use of probiotic bacterial strains excluding the use of fermented product to seed further batches.	Only probiotic products approved by the appropriate competent authorities can be used.

Rationale - It is the farmer's responsibility to reduce the risk of spreading pathogens by taking adequate measures to contain diseased crustacea and dispose of dead crustacea in a sanitary way. It is also the farmer's responsibility to avoid environmental side-effects from the measures taken to mitigate disease (e.g., adjustment of feed applications in the instance of pond mortality, proper discarding of dead crustacea, etc.). The major goal of this criterion is to encourage farmers to develop the skills necessary to address disease management.

Use of antibiotics

The crustacean industry has made progress in disease prevention, especially with the development of selected stocks free of pathogens such as SPF. Experience in many countries has shown that the use of veterinary medicines, especially antibiotics, is not effective for treating most diseases, particularly viral diseases, and is not justified when effective biosecurity measures are implemented. The labelling of products treated with veterinary medicines is not allowed under this Standard and crustacea from treated ponds cannot be sold under the ASC certification. Therefore, the ASC Shrimp Standard encourages the use of alternative disease prevention measures before medicinal treatments.

If veterinary medicines and chemicals are used, they must:

- be approved for use in aquaculture by national authorities, the FDA, and the Council Regulation EEC No. 2377/90 Annex 1 (EU-Lex 1990).
- Be based on a diagnostic test (no growth promotion or prophylactic use)
- follow all labelled instructions including withdrawal, handling and storage

The use of antibiotics is permitted on certified farms however, crustacea in specific ponds that have received medicated feed are not authorised to carry the ASC label. Additionally, no farm will be certified as ASC compliant if a WHO categorised "critically important" antibiotic was administered to any crustacea.

Use of pesticides

Pesticides are used by some farms for eliminating pathogen carriers and competitors from water used to fill ponds prior to stocking crustacean post larvae. The ASC Shrimp Standard determined that pesticides that are banned or restricted under international conventions, because of severe risks to the environment and human health, must not be used. There is allowance for treating water in the absence of crustacea with tea-seed-cake, Rotenone and chlorine. There was concern on the ShAD that even these allowable pesticides could have negative impacts, as they do kill fish. Therefore, the Standard requires that water treated with these pesticides must be held for the appropriate time before release to ensure that aquatic organisms in the receiving waters are not killed.

Use of probiotics

Probiotics, which are natural and beneficial bacteria, are increasingly used in crustacean farming in different forms and for different purposes. Probiotics are used as feed additives to modify the microbial communities in the digestive tract of crustacea or applied directly to ponds with the objective of competing with and displacing pathogens, and as a result, improving crustacean growth and survival (Moriarty & Decamp, 2009). Probiotics are also used for improving pond water and soil quality (Boyd & Gross, 1998| Gatesoupe, 1999). There are concerns that some bacterial species or strains contained in commercial products or resulting from uncontrolled fermentation conducted on-site may be inappropriate or even hazardous for crustacea and humans (Moriarty & Decamp, 2009). On this basis, the ASC Shrimp Standard considers that the use of probiotics in crustacean culture needs to be restricted to commercially available microorganisms and only those approved by the appropriate authority.

Guidance for Implementation

5.3.1: This requirement applies to all antibiotics, all application methods and to both direct use and medicated feed.

5.3.2: Copies of the national regulations must be available for the auditor upon request. Farmers must be able to demonstrate a working knowledge of banned WHO antibiotics and show that they are not using them.

5.3.5: For lists of banned or restricted pesticides, refer to the following documents:
Annex III of the Rotterdam Convention on Prior Informed Consent (UNEP, 2004)
Stockholm Convention on Persistent Organic Pollutants (UNEP, 2019). Annex A, B and C

The WHO-recommended classification of pesticides by hazard and guidelines to classification (WHO, 2019).

5.3.6: All chemicals must be neutralised before discharging them into the environment and there can be no evidence of impacts from chemicals in adjacent ecosystems.

5.3.7: Only products authorised by competent authorities and disclosing the names of microorganisms included in the product are allowed for use in crustacean ponds. Farmers are responsible for verifying that the products they use do not contain any pathogenic (either for crustacea or humans) species. On-site fermentation of probiotics, if practiced, must be done according to the protocol provided by the suppliers, including taking all required precautions to ensure that they do not have contaminant strains. Fermented products cannot be used for seeding further fermentation batches. All batches must be seeded using a commercial probiotic.

PRINCIPLE 6: MANAGE BROODSTOCK ORIGIN, STOCK SELECTION AND EFFECTS OF STOCK MANAGEMENT

Impact: Crustacean farming can have negative impacts on wild crustacean populations and the environment due to the collection of wild crustacea as post larvae and broodstock, and the introduction and escapes of non-native crustacean species or genetically distinct native species.

Criterion 6.1 Presence of exotic or introduced shrimp species

INDICATOR	REQUIREMENT
6.1.1. Use of non-indigenous crustacean species.	Allowed, provided it is in commercial production locally AND there is no evidence ⁷¹ of establishment or impact on adjacent ecosystems by that species AND there is documentation (hatchery permits, import licenses, etc.) that demonstrates compliance with introduction procedures as identified by regional, national, and international importation guidelines (e.g., OIE and ICES).

⁷¹ ASC recognises that establishing “no evidence” is difficult and this issue will be monitored by the ASC Technical Advisory Group which will evaluate this on a case-by-case basis to determine how this should be applied in various localities.

<p>6.1.2. Prevention measures in place to prevent escapes at harvest and during grow-out include:</p> <p>A. Effective screens or barriers of appropriate mesh size for the smallest animals present; double screened when non- indigenous species.</p> <p>B. Perimeter pond banks or dykes are of adequate height and construction to prevent breaching in exceptional flood events⁷²</p> <p>C. Regular, timely inspections are performed and recorded in a permanent register</p> <p>D. Timely repairs to the system are recorded</p> <p>E. Installation and management of trapping devices to sample for the existence of escapes; data is recorded</p> <p>F. Escape recovery protocols in place</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>
<p>6.1.3. Escapes and actions taken to prevent reoccurrence.</p>	<p>Records are available for inspection.</p>

Rationale - The ShAD recognizes that hatchery standards are necessary, but unfortunately none currently exist, and the ASC believes that interim requirements are necessary to address certain impacts until hatchery-specific standards are developed. ASC will ensure that the appropriate messages are communicated to consumers, depending on the auditing schemes that are developed.

According to the FAO (FAO, 2019), introduced species are considered one of the major threats to global biodiversity and can also have significant social and economic impacts. Aquaculture has been one of the major pathways for

⁷² Exceptional Flood Events= 25-year flood events.

introducing non-native aquatic plants and animals that, in some cases, have become harmful invasive species.⁷³ Accidental or intentional introductions of non-native species have become an alarming global environmental problem (Leung & Dudgeon 2008). The ASC Shrimp Standard defines “exotic species” as non-native species living in areas outside their native boundaries and “established species” as an introduced population that is currently reproducing and sustaining in the wild without further introductions of any kind.

The main aim of the ASC Shrimp Standard regarding introductions of non-native species is to discourage introductions of farmed crustacean species into waterways where they are not native or previously established. Worldwide transfers and introductions of *Penaeus monodon* and *P. vannamei* were widespread in the early history of shrimp culture (Rönnbäck, 2002). Introductions of *P. monodon* occurred from Asia to Latin America of *P. vannamei* in the opposite direction (Phillips, Lin and Beveridge 1993). ICES Code of Practice on the Introduction and Transfer of Marine Organisms (ICES, 1994) is one of the most comprehensive instruments to help in the responsible use of introduced species but is only voluntary. *P. vannamei* is thought to have been illegally imported to several Asian countries (Bondad-Reantaso 2004), despite efforts to outlaw the introduction of non-native species. First introductions of *P. vannamei* to Asian countries occurred as follows: Mainland China, 1988; Pacific Islands, 1972, Taiwan, 1995; Philippines, 1997; Thailand, 1998; Vietnam, 2000; Indonesia, 2001; Malaysia, 2001; and India, 2001.

Such introductions and transfers have led to concerns that individual species can escape and compete with local fauna (Briggs *et al.*, 2005; Phillips, Kwei Lin & Beveridge, 1993). However, although there appear to be some specific examples of escapes occurring, there are little or no hard data on their ecological impact (Briggs *et al.* 2005). *P. vannamei* represents the majority of globally farmed shrimp production and is an exotic species in most of the areas where it is grown. Although exotic species have been deemed a critical conservation concern globally, as they can significantly disrupt ecosystem function and species interactions, in the case of *P. vannamei* there is currently no evidence (Briggs *et al.* 2005) to suggest that the use of this species poses a significant risk to adjacent ecosystems in areas where it is exotic. Therefore, the current version of the ASC Shrimp Standard allows for the culture of *P. vannamei* in areas outside its native range but does not allow it to be introduced into a new area. Future revisions of the Standard will respond to new research developments, and the ASC Shrimp Standard will change its

⁷³ **Invasive species:** “animals, plants or other organisms introduced by man into places out of their natural range of distribution, where they become established and disperse, generating a negative impact on the local ecosystem and species.” (IUCN).

position if the evidence suggests that there is a significant risk of impact to ecosystems due to the culture of *P. vannamei* in areas outside its native range.

Sufficient evidence (Fuller, *et al.* 2014) exists to suggest that there is a risk of impact when *P. monodon* is cultured in areas outside of its native range, as there are reports from several regions of the world that demonstrate its ability to colonize foreign habitats.

As for the farming of native species, there is potential for escapes to breed with wild crustacea of the same species, which could cause changes to the wild population's genetic structure (e.g., genetic drift). There is also concern about the movement of geographically or genetically distinct populations of animals due to crustacean aquaculture activities. In both cases, new genes could be introduced into the wild population via escapes, which could affect the health of wild crustacean species. Currently, the ASC Shrimp Standard does not have restrictions on the use of native species but escape management requirements are included.

Risk assessment is a key approach to determining whether crustacea in existing or proposed facilities are likely to escape and become established. However, risk assessment is controversial and some of the elements are based on observation rather than in-situ measurements of population structures. There are also knowledge gaps on the effects of escapes, as limited research has been conducted for either *P. vannamei* or *P. monodon*. The ASC Shrimp Standard seeks to find the right balance between environmental sustainability, social protection, and the economic viability of the industry. The Standards allow the farming of non-indigenous crustacean species in countries where they were in commercial production locally by the date of publication and there is no evidence of establishment or impact on adjacent ecosystems. This is in combination with conditions to prevent escapes, promote containment and ensure the legality of broodstock movement.

Managing escapes

Globally, escapes from aquaculture facilities have been found to be a significant cause of the introduction of exotic species. Escape of native species has been found to have significant impacts on wild populations (e.g., salmon aquaculture). Escaped crustacea can also establish non-native (feral) populations in areas where they are being farmed and transfer exotic pathogens from the farm to the wild environment.

The reality for crustacean farmers is that, in the absence of a system that is closed cycle or full recirculation, escapes are inevitable and complete prevention is impossible. The ASC Shrimp Standard addresses the issue of escapes via a series of BMPs (Best Management Practices e.g., physical infrastructure to limit risks of

potential escapes), data collection and record-keeping. This serves as a first step for this Standard and will help the development of performance-based ASC Shrimp Standard. Percent recovery requirements were also considered, but it is not currently feasible to accurately count the number of crustacea that enter a pond, which makes it impossible to estimate how many disappear due to escapes versus other causes (e.g., mortality and predators). This may be reconsidered for future versions of the Standard, when more escape data are available and counting technologies are more advanced.

Severe weather events are the most likely cause of catastrophic escapes from crustacean farms. The ASC Shrimp Standard requires that crustacean farms be designed to prevent catastrophic escapes due to human error and/or storms. This is an issue of risk reduction in relation to the fluctuation of weather patterns. Farms need to be built to withstand weather conditions based on regional norms for weather in the farming region.

Guidance for Implementation

6.1.1: Farms must be able to provide evidence to demonstrate the start date of any non-native species being cultured. Farmers must provide hatchery permits and import licenses. Farmers must demonstrate that they have a working knowledge of the ICES Code (ICES, 1994) and have complied with them for culturing a non-native species. The ASC Shrimp Standard considers demonstration of complete separation or closed containment as an acceptable measure against the effects of exotic species and supports certification of those systems in any region assuming they comply with the other requirements. The introduction of new/exotic/non-indigenous species must comply with national law as specified in Principle 1.

6.1.2: Records and protocol documents must be made available for inspection during the audit.

6.1.3: Escapes records must be made available for inspection. The ASC Shrimp Standard recognises the challenges of recording all escapes but expects farmers to do due diligence on this requirement and record any observed escapees.

Criterion 6.2 Origin of post larvae or broodstock

INDICATOR	REQUIREMENT
6.2.1. PL and broodstock have appropriate disease-free status and sources meet regional, national, and international importation guidelines (e.g., OIE and ICES).	Yes
6.2.2. Percent of total post larvae from closed loop hatchery (i.e., farm-raised broodstock).	100%.
6.2.3. Allowance for wild-caught PL other than natural tidal flow into ponds.	None

Rationale - Disease problems within the crustacean aquaculture industry have been catastrophic in the past, resulting primarily from poor biosecurity and the transboundary movements of non-indigenous species. The movement of crustacea across borders brought new threats of disease transmission and reduced biodiversity to crustacean farming areas around the globe. The ASC Shrimp Standard mandates compliance with international importation guidelines for the prevention of disease and the use of SPF and PL (see Principle 5).

Wild collection of PL added to the disease problems that the shrimp aquaculture industry experienced in addition to having high by-catch of untargeted marine species and impacts to the health of wild shrimp populations. The ASC Shrimp Standard does not allow the collection of wild PL or broodstock, with the exception of natural influx systems that use wild PL, provided those systems are in compliance with all other parts of the ASC Shrimp Standard.

While hatchery production still necessitates the occasional collection of some wild-caught broodstock (from suitably certified broodstock fisheries) for genetic enhancement, the potential impact of this activity is far less significant than using wild-caught PL. The ASC Shrimp Standard requires that 100% of PL are from a

closed loop hatchery, which is defined as a hatchery relying predominantly on hatchery-raised broodstock to produce PL.

Guidance for Implementation

ASC recognizes that auditing these requirements are based on documentary evidence supplied by the hatchery and that this may be a challenge for non-vertically integrated operations. It is expected that the ASC will develop mechanisms to address this situation.

6.2.1: Compliance shall be demonstrated by hatchery permits and import licenses. Farmers must demonstrate open lines of communication with their suppliers and demonstrate that they have a working knowledge of the guidelines and are in compliance.

6.2.2: Farms must be able to prove the source of their post larvae. The ASC Shrimp Standard is willing to make an exception for natural influx systems (6.2.3) provided they are compliant with all other aspects of the standard.

Criterion 6.3 Transgenic⁷⁴ crustacea

INDICATOR	REQUIREMENT
6.3.1. Allowance for the culture of transgenic crustacea (including the offspring of genetically engineered crustacea).	None

Rationale - The culture of transgenic crustacea is prohibited by the ASC Shrimp Standard. The ASC Shrimp Standard recognises that there is a difference between transgenic and genetically enhanced⁷⁵ crustacea and is only concerned about transgenic crustacea at this time.

With the current high frequency of farmed crustacean escapes, the ASC Shrimp Standard is concerned about the uncertainty surrounding the potential impacts of escaped transgenic crustacea breeding with wild crustacea, and the potential for transgenic crustacea to establish feral populations in the wild environment. Invoking the precautionary principle, the ASC Shrimp Standard cannot allow for these species to be cultured until there is conclusive evidence that demonstrates that they pose an acceptable risk to adjacent ecosystems. This is not to say that transgenic crustacea are banned forever, but there is no justification for their use at this time, and that precautions to be taken when rearing those transgenic crustacea are still to be defined for them to be both environmentally and socially responsible.

⁷⁴ **Transgenic:** a subset of GMOs; organisms which have inserted DNA that originated in a different species.

⁷⁵ **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.

Criterion 6.4 Transporting live crustaceans

INDICATOR	REQUIREMENT
6.4.1 Presence and evidence of use of crustacean transport containers that have no escape path for these species.	Yes

Rationale - Escapes are not necessarily limited to on-farm escape incidences. There is also the potential for the unintentional release of crustaceans from transport containers. Thus, whether the transfer of PL to the farm or the transfer of harvest size crustaceans to markets or processing facilities, a risk is present and must be minimised. To minimize this risk, producers are mandated to use sealed containers with no escape route for crustaceans.

PRINCIPLE 7: USE RESOURCES IN AN ENVIRONMENTALLY EFFICIENT AND RESPONSIBLE MANNER

Impact: The culture of crustacea often requires the intensive use of resources. The use of wild-caught (e.g., pelagic fish) and terrestrially farmed ingredients (e.g., soy) in crustacean feed has a potentially negative impact on marine and terrestrial ecosystems. Energy use also requires specific attention. This principle not only addresses the origin of resources but also seeks to improve the overall efficiency of the production system and ensure that wastes are treated properly so that effluent has a limited impact.

Criterion 7.1 Traceability of raw materials in feed

INDICATOR	REQUIREMENT
7.1.1. Evidence of basic traceability of feed ingredients, including source, species, country of origin and harvest method demonstrated by the feed producer.	List of all ingredients making up more than 2% of the feed available provided on company letterhead.
7.1.2. Demonstration of chain of custody and traceability for fisheries products in feed through an ISEAL member or ISO/IEC 17065:2012 compliant certification scheme that also incorporates the FAO Code of Conduct for Responsible Fisheries.	Yes

Rationale -ASC recognises the auditing challenges associated with these requirements and will develop effective auditing mechanisms and have developed a separate feed standard. ASC will also ensure that farmers will not be penalised by

“cheating” at the feed mill, and that the appropriate messages are communicated to consumers, depending on the auditing schemes that are developed.

Marine ingredient sourcing for feed is a key off-farm issue requiring special consideration, as traceability and fisheries certification are still in their infancy, making the process of creating auditable standards very challenging. The mislabelling or fraudulent labelling of fisheries products is also a major problem in the seafood industry that could undermine sustainability initiatives for proper sourcing. The goal of the current standards is to mandate continuous improvement with the expectation that sustainable and traceable sources of feed will be available in the future.

Traceability and transparency of major feed ingredients are important to ensure the credibility of feed sourcing. To satisfy the standard, feed producers are obliged to declare (but only to auditors) all sources of fishmeal, fish oil and other major ingredients above a 2% inclusion rate. Proprietary arguments against the full traceability and transparency of ingredients are not an acceptable argument for non-compliance, as the standards require innovations on behalf of producers and full traceability of feed ingredients to ensure the long-term sustainability of feed sources. Furthermore, the disclosure of only significant ingredients, and not the micronutrients, allows a higher probability of compliance with this standard.

Secondly, all fishery components of a feed must be chain-of-custody certified by an ISEAL accredited or International Standard Organization (ISO)⁷⁶ ISO/IEC 17065:2012-compliant certification scheme that also incorporates the FAO Code of Conduct for Responsible Fisheries (FAO, 1995).

Guidance for Implementation

7.1.1: A document from the feed supplier (on company letterhead) must be provided to the auditor that lists the ingredients above 2%, states personal accountability for the veracity of the claim by the top QA/management staff, and gives permission for the relevant content of auditor reports to be disclosed to purchasing retailers. Initially, the farmer is required to provide all the information that he or she has available to help clarify where improvement is required.

7.1.2: Requires the demonstration of chain of custody and traceability for fisheries products in feed through an ISEAL-accredited or ISO/IEC 17065:2012-compliant certification scheme that also incorporates the FAO Code of Conduct for Responsible Fisheries.

⁷⁶ <http://www.iso.org/>

Criterion 7.2 Origin of aquatic and terrestrial feed ingredients

INDICATOR	REQUIREMENT
<p>7.2.1. a. Timeframe for 100% (mass balance) fishmeal and fish oil used in feed to come from fisheries⁷⁷ certified by a full ISEAL member⁷⁸ that has guidelines specifically promoting ecological sustainability of forage fisheries.</p> <p><i>OR FOR THE INTERIM 7.2.1b. or 7.2.1c.</i></p>	<p>NR; see Interim Feed Solution/Feed Standard.</p>
<p>7.2.1. b. FishSource⁷⁹ or equivalent score, for the fishery(ies) from which a minimum of 80% of the fishmeal and fish oil by volume is derived (See Appendix VII, subsection 3 for explanation of FishSource scoring)</p> <p>a. for FishSource Criteria 4 (current health)</p> <p>b. for FishSource Criteria 1, 2, 3 and 5</p>	<p>a. 6</p> <p>b. 6 or compliance with alternative interim proposal 7.2.1c</p>

⁷⁷ This standard applies to fishmeal and oil from forage fisheries and not to by-products or trimmings used in feed.

⁷⁸ Such as the Marine Stewardship Council (MSC) which encourages positive steps towards promoting the sustainability of capture fisheries.

⁷⁹ <http://www.fishsource.org/>

<p>7.2.1. c. Lacking a FishSource assessment a fishery could be engaged in an Improvers Program (transparent and public Fisheries Improvement Project (FIP) with periodic public reporting).</p>	<p>See Appendix XI for details on compliance.</p>
<p>7.2.2. Percentage of non-marine ingredients from sources certified by an ISEAL member's⁸⁰ certification scheme that addresses environmental and social sustainability.</p>	<p>80% for soy and palm oil.</p>

Rationale - Currently, nearly 90% of fish stocks globally are fully exploited or overfished (FAO 2016). Aquaculture is touted to relieve pressure on wild fisheries by generating an alternative seafood supply. However, this will only be true if aquaculture operations make efficient use of wild fish ingredients. Although it is difficult to audit at the farm level, the use of wild fisheries specifically for fishmeal and fish oil for shrimp feed was identified as a major impact that needed to be addressed by these standards. Defining sustainable sourcing for marine feed ingredients is challenging, as none of the current assessment tools for fish feed ingredients or feed are fail-safe.

ASC recognises the auditing challenges associated with these requirements and will develop effective auditing mechanisms and have developed a separate feed standard. ASC will also ensure that farmers will not be penalised by “cheating” at the feed mill, and that the appropriate messages are communicated to consumers, depending on the auditing schemes that are developed.

To ensure that fisheries that are clearly unmanaged or mismanaged are not a major source of feeds, it was proposed that within five years of publication of these standards farmers must be sourcing fishmeal and fish oil from a full ISEAL member’s certification program.

In the interim period, prior to 7.2.1a being achievable, a farm may opt to use a feed containing 80% by volume fishmeal and fish oil bearing a score of 6 on FishSource

⁸⁰ Includes community members

scoring category 4, and 6 or higher in all other categories. Additional requirements include no “N/A” in Score 2 (whether managers follow scientific advice) and Score 4 (stock assessment) along with “N/A” in no more than one other score.

ASC recognizes that to some this standard may be insufficient, as it does not fully address the impact of removing forage fish in large quantities from the base of the marine food chain. This standard will need to evolve as new knowledge emerges.

The ASC Shrimp Standard supports the use of human food-filleting waste from environmentally preferable fisheries or aquaculture facilities. The International Fishmeal and Fish Oil Organization (IFFO)⁸¹ reports that 25% of fishmeal currently being used for aquaculture is coming from fish processing by-products and this amount is expected to increase. While the ASC Shrimp Standard encourages the use of by-products, it recognizes that this can result in higher feed conversion ratios (FCRs), which results in trade-offs between effluent concentration and efficient use of marine resources. The ASC Shrimp Standard has attempted to address this trade-off by requiring reporting of eFCR (see Criterion 7.4).

As the production of terrestrial feed ingredients can have significant environmental and social impacts, the Standard avoids replacing unsustainable marine feed ingredients with equally damaging or unsustainable non-marine alternatives.

Guidance for Implementation

7.2.1a: ISEAL is a global association for social and environmental standards systems. The ASC Shrimp Standard strives to meet the ISEAL guidelines for standard setting. The farm’s feed manufacturer may use the “mass balance approach” to demonstrate that it purchased the appropriate amount and kind of “certified” ingredients to supply feed to all its customers making a similar request. Fishmeal and fish oil used in shrimp feed (including those made from fisheries by-products) must not contain products from a) target fisheries that are on CITES Appendix I, on the IUCN’s Red List in categories: Near Threatened, Vulnerable, Endangered and Critically Endangered, b) a target fishery that has bycatch with significant impact on species listed on CITES Appendix I, on the IUCN’s Red Listed species (categories as above), upon landing, on an annual basis or c) bycatch with significant impact on CITES/IUCN listed species.

⁸¹ <http://www.iffonet.net/iffonet-rs>

7.2.1b: Fishery status information may be accessed through FishSource and IFFO Responsible Fisheries.

7.2.2: Compliant sources for soy could include the Roundtable for Responsible Soy Production (RTRS) or its recognised equivalents: Proterra and Donau Soja/Europa Soya. Compliant sources for palm oil could include the Roundtable on Sustainable Palm Oil (RSPO) or the Rainforest Alliance's Sustainable Agriculture Standard. Refer to the ISEAL website for other member-compliant schemes as added.

Criterion 7.3 Use of genetically modified (GM) ingredients in feed

INDICATOR	REQUIREMENT
<p>7.3.1. Allowance for feed containing ingredients that are genetically modified ONLY when information regarding the use of GM ingredients in shrimp feed is made easily available to retailers and end consumers, including:</p> <ul style="list-style-type: none">a. Disclosure on the audit reports if GMO ingredients were used in the feed fed to shrimpb. Disclosure if GMO ingredients were used in the feed fed to ASC-certified shrimp all along the supply chain up to the retailer. Total disclosure on the revised auditor reports is published on an easy-access database on the ASC web page. This database should be made available on demand to retailer and consumers.c. Use of the most adequate, fast and user-friendly communication tools to inform retailers and consumers on all certified products.	<p>Yes.</p>

OR For farmers using GM-free feed:	
7.3.2. List of feed ingredients does not contain any GMO. ⁸²	Yes
7.3.3. Non-GMO feed traceability by the feed producer and on the farm.	Yes
7.3.4. Samples taken randomly by the auditor are tested negative by PCR.	Yes

** List shall include all ingredients making up more than 2% of the feed and shall specify whether they are GM-free or not.*

Value Statement:

The standard setting process recognized the complexity of the genetically modified organism (GM)⁸³ issue and there was significant debate about this issue given concerns about availability and cost of non-GM feed ingredients, the social and environmental impacts of GM crops and the potential for this issue to affect consumer trust and the brand of the ASC. The ASC Shrimp Standard requires that it must be proven that GM ingredients used in feed for farms applying for ASC certification have addressed ecological impacts and risks, are socially responsible and ensure that there is full transparency down to the end consumer and all along the supply about their inclusion. ASC accepts that there are limitations to the effectiveness of this standard in addressing all major ecological and social risks until a feed standard is developed in a multi-stakeholder, inclusive, science-based process.

Rationale - The allowance for GM in feed versus their exclusion was a very challenging issue for the ShAD which identified the following as a problem statement:

⁸² List shall include all ingredients making up more than 2% of the feed and shall specify whether they are GM-free or not.

⁸³ **Genetically Modified Organism:** refers to the introduction of foreign genes into the genome of the organism or alteration of the genome in ways that does not occur naturally by mating and/or combination. This is not the same as selective breeding for genetic improvement.

In a science-based and culturally sensitive context, how do we satisfy the needs of opposing market forces and expectations of consumers regarding the allowance of GM ingredients for shrimp feeds, while preserving our mandate to develop socially and environmentally responsible performance indicators for the top 20% of global shrimp producers?

ASC Shrimp Standard is working toward a goal where there are no significant environmental and social impacts associated with the use of GM feed ingredients. Furthermore, there is agreement that a complete ban on GM ingredients is not appropriate at this time nor is the allowance of GM ingredients without transparency. There is further acknowledgement that this issue needs to be addressed by a separate feed standard.

The core the ShAD concerns articulated on this issue include (in no particular order):

- The standard must be precautionary regarding environmental and social concerns, while still being considerate of the limitations for producers
- The feasibility of reliably verifying non-GM sources
- The necessity of creating an accountable market system with full-cost accounting, including risks and externalities to get the big picture
- The importance of label integrity and transparency
- The creation of market benefits for technologies that could end up impeding fair/equal access to food
- The importance of maintaining biodiversity
- The price feasibility and access to non-GM ingredients, especially for producers in the Americas

As the ASC Shrimp Standard aspires to promote a world where there are no significant social and environmental impacts of GM feed ingredients, the ASC Shrimp Standard aimed to create incentives to reach this goal.

Current science does not provide a comprehensive understanding of the environmental, health or social risks and benefits associated with the production of GMs, yet decisions with real market consequences need to be considered in the absence of conclusive scientific information on this issue. The literature concerning the GM issue has compelling arguments on both the risks and benefits of GM crops. The ASC Shrimp Standard is not opposed to genetic modification in general, which has demonstrable benefits and minimal risks in a variety of situations (e.g., fields of medicine, pharmaceuticals). However, demonstrated risks currently associated with introgressive hybridisation, selection for pest resistance and

chemical resistance of crop-competitive weeds are considerable. Furthermore, as GM crops are grown in open ecological systems, they may have potentially serious consequences for human food security. For these reasons, the ASC Shrimp Standard will continue to move towards precautionary preclusion of open-grown GM-plant ingredients until there is strong evidence that such risks can be reliably mitigated or do not exist.

The current ASC Shrimp Standard mandates that information on the inclusion of GM feed ingredients shall be available for buyers (e.g., retailers) and consumers who would like to consider this information when purchasing their products. If the feed contains genetically modified raw plant material or raw materials derived from genetically modified organisms, shrimp producers must be able to provide information to the buyer documenting their use. Given this requirement, shrimp producers and/or buyers will need to collect information regarding raw materials that are derived from genetically modified material from their feed producer.

Some members of the decision-making body of the ShAD advocated for the exclusion of genetically modified feed ingredients due to concerns that this could affect both the current and future use of the standards. Inclusion/exclusion of GM plant products also has regional implications in terms of availability opportunities for feed manufacturers and market access for shrimp farmers. For shrimp producers in the Americas and some areas in Asia, non-GM feed ingredients, particularly soy products, are not readily available and may be available at a significantly higher cost or diminished quality than GM ingredients. This could negatively affect the global uptake of these standards. There are differences in European and North American consumer perceptions of the human health and ecological risks relating to GMOs. North American markets depend more heavily on GMOs than European markets, and North American consumers are less risk-averse to GMOs than European consumers.

There may be long-term environmental and social consequences from shifting global demand for GM versus non-GM plants proteins for aqua feeds. The current availability of GM soy could support present levels of aquaculture, whereas increasing demand for GM-free plant protein has the potential to cause further deforestation in important biodiversity areas (e.g., the Amazon rainforest). The benefits of promoting non-GM plant proteins for feed on certified farms is that it generates additional demand for industrial agriculture to maintain the biodiversity of heirloom crop strains and to increase the farming of plant proteins known to present low genetic risks to terrestrial ecosystems.

For the above reasons, the ASC Shrimp Standard mandates transparency for the use of GM ingredients as a first step for the Standards. The traceability of feed ingredients over 2% is already covered in Principle 7.1; therefore, the goal of 7.3 is to make sure that the information regarding GMO in feed remains linked to a

particular batch of products from a certified farm throughout the supply chain, as there are currently no controls/audits between the farm and the retailer. This compromise was achieved by including a set of standards that mandate transparency on the part of feed producers and allow purchasers in different regions to respond to the needs of their customers or in-house purchasing policies.

The ASC's Technical Advisory Group will review the Standard within five years and assess the availability, utilisation cost difference, market penetration and the credibility risk for GM ingredients and update the Standard accordingly.

Allowance for on-package labelling of positive statements such as “fed with GMO-free ingredients” is possible when allowed by legislation and the retailer and if the audit report demonstrates its compliance (NOTE: this co-labelling is not associated with the ASC label but can be separate on a package label). This requirement needs to be mentioned in the Standard for two reasons: one is to make publicly clear that a positive statement regarding non-GMO feeds is authorised for ASC-certified products respecting ASC Shrimp Standard and to put clear conditions for the use of such statement under ASC standards with the evidence of absence being mandatory. The “evidence of absence” is provided by both the documentation and traceability of the feed and the feed sample taken randomly and PCR tested.

Guidance for Implementation

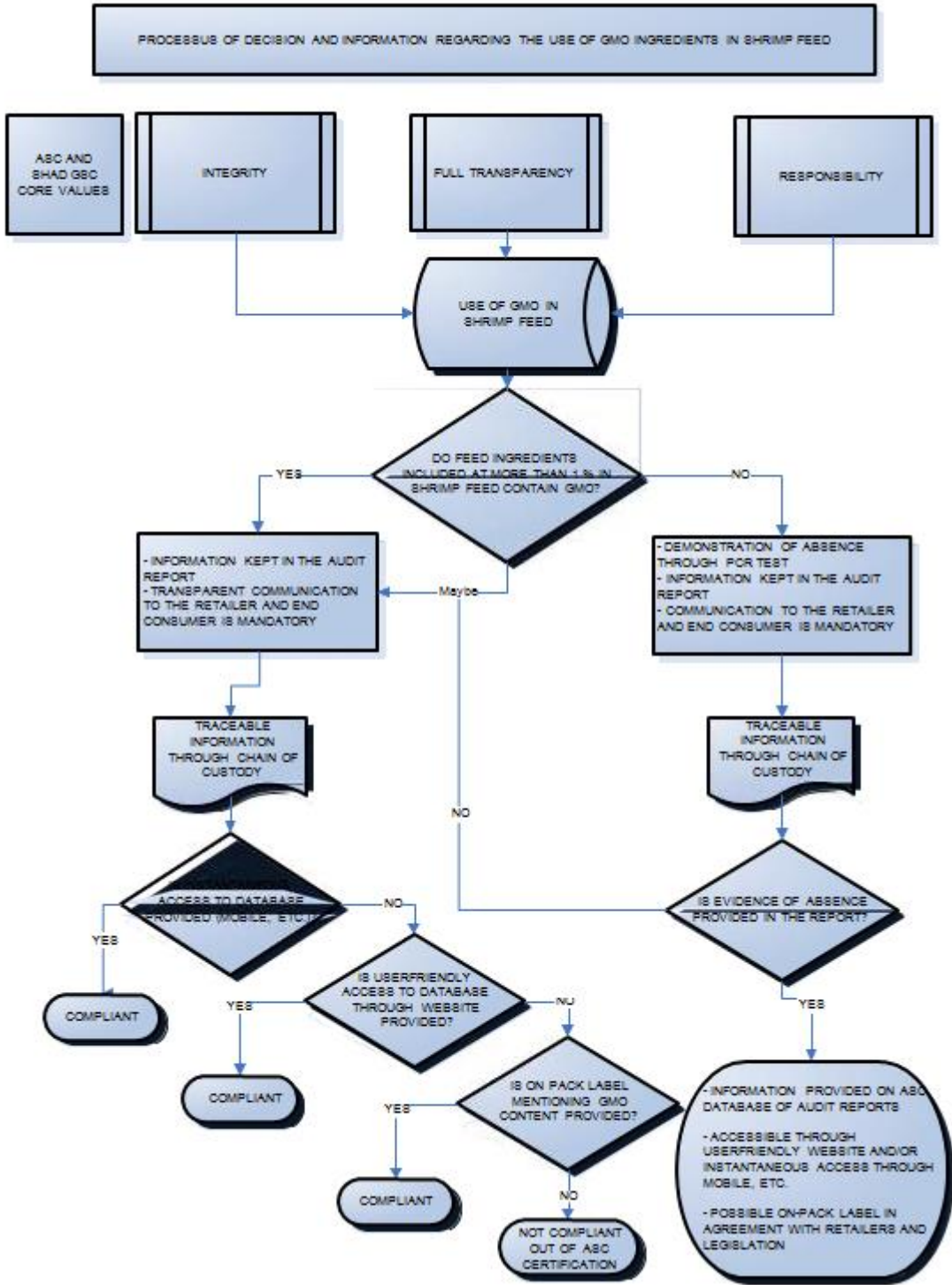
Evidence of the presence or absence of GM ingredients in feeds must be collected by the auditor.

Evidence must include feed manufacturer declarations and records and testing of a feed sample (e.g., using biomolecular tools to confirm the presence or absence of GM - according to the limit of detection and tolerance commonly accepted by the current legislations).

Three possible conclusions can arise, depending on whether clear evidence of presence or absence of GMOs are collected, or doubts remain in the absence of clear declarations from the feed manufacturer:

- Feeds used are guaranteed GM-free.
- Feeds used contain GM ingredients.
- Feeds used may contain GM ingredients.

Such conclusions from the analysis of evidence need to be communicated through the chain of custody according to the decision tree below.



Criterion 7.4 Efficient use of wild fish for fishmeal or oil

INDICATOR	REQUIREMENT
7.4.1. Forage Fish Dependency Ratio (FFDR) ⁸⁴	<i>P. vannamei</i> 1.3:1 <i>P. monodon</i> 1.8:1 <i>Cherax spp., Procambarus spp., Astacus spp.</i> : 1.4:1 <i>Macrobrachium spp.</i> : 2.1:1
7.4.2. a. Economic Feed Conversion Ratio (eFCR)	Records are available
AND	
7.4.2. b. Protein Retention Efficiency (PRE)	<i>Penaeus spp.</i> : >30% other species: Records are available

Rationale - The ASC Shrimp Standard mandates an FFDR that measures the efficiency of marine inputs used for production. While sustainable sources of feed ingredients are one important criterion for sustainable production, the efficiency of use is another. Efficient use of resources will increase in importance as global resources become more limited. The use of forage fish and other marine ingredients (e.g., squid, krill) as feed inputs for shrimp is a great concern, given that aquaculture production is rapidly growing and there is a finite supply of forage fish

⁸⁴ **Forage Fish Dependency Ratio (FFDR)**: the quantity of wild fish used per quantity of cultured crustacea produced.

and other marine resources. In the interest of providing the greatest social and nutritional benefits from such resources, marine ingredients must be harvested sustainably and subsequently used efficiently.

The ASC Shrimp Standard sets different FFDRs for each of the six species of shrimp based on their different nutritional requirements. These performance levels represent a good initial baseline for this requirement which may be harmonised over time.

The eFCR (7.4.2a) requirement is included to help guard against wasteful feeding rates that could still meet FFDR performance thresholds when using feeds with particularly low inclusion rates of whole wild fish. Such low inclusion rate feeds can be achieved by increasing the proportion of fisheries by-products or plant proteins in formulations. Both represent valuable resources in their own right that may also have their own environmental and social impacts (e.g., deforestation, pesticide use, etc.). As such, both must be used efficiently. Asking farmers to achieve threshold eFCRs aligns incentives around the following: accurate tracking of crustacean weight/biomass, good feed management to keep feed fresh and assure no waste prior to use, careful tracking of parameters to optimise feed uptake by crustacea (presentation, frequency of offering, correct pellet size, time of feeding, etc.), and adjusting feeding rations based on feeding activity.

However, eFCR varies with the size of crustacea harvested and climate conditions under different latitudes, and the ShAD has decided to not set a threshold for eFCR. Data collected from audited farms will be used for setting standards in future versions.

7.4.2b Protein Retention Efficiency (PRE) is a measure of the net protein loss in the aquaculture system and, unlike FFDR, gives an indication of the conversion efficiency of all protein ingredients, not just fish and fishmeal (i.e., it includes terrestrial plant and animal proteins). Unlike FCR, which is confused by dry fed to wet crustacean conversions, and which varies greatly with crustacean size, PRE gives a direct measure of feed efficiency. While it still uses FCR, its calculation only requires the feed protein level that is printed on every feed bag. An efficiency of 30% of protein fed being retained in shrimp harvested has been set for penaeid species in the current version of the Shrimp Standard and metrics may be developed for other species in future versions.

Guidance for Implementation

7.4.1: In the case of crustacea, fish meal will be the determining factor for the FFDR, as fish oil use in crustacean feed is very low. Please note that fisheries by-products that meet the sustainability and traceability criteria in 7.1 and 7.2 do not count in

these calculations and can therefore be used to assist producers with achieving compliance.

$$FFDR_m = \frac{(\%FM \text{ in feed} \times eFCR)}{22.2}$$

In case a farm uses different feeds, a weighted average fishmeal content must be calculated as follows:

$$\% \text{ FM in feed} = \frac{(\%FM \text{ Feed A} \times \text{quantity Feed A}) + (\%FM \text{ Feed B} \times \text{quantity Feed B}) + \dots}{\text{Total quantity Feeds A, B ...}}$$

7.4.2a: The eFCR is calculated for all harvests over the last 12-month period.

$$eFCR = \frac{\text{Feed (kg/mT)}}{\text{Total production (kg or mT wet weight)}}$$

Official invoices for feed purchases may be used by the auditor. Farmers can show records of production and quantities of feed used for all harvests. Records of eFCR and harvest size for every harvested pond need to be collected by the auditor.

7.4.2b: Protein retention efficiency (PRE) is a measure of the amount of protein provided in the feed that is retained in the harvested crustacea and is used here as an alternative indicator of the efficiency of use of feed resources (i.e., all feed ingredients including by-products). Shrimp protein content in the equation below can be a constant based on the literature (i.e., about 19%). ASC will collect data towards a requirement that best reflects responsible aquaculture for future Standard revisions.

$$PRE = \frac{\% \text{ protein in harvested shrimp}}{eFCR \times \% \text{ protein in feed}} \times 100\%$$

In case several feed formulations are used, a weighted average protein content needs to be calculated based on the quantities of the different feeds consumed over the last 12-month period.

Criterion 7.5 Effluent contaminant load

INDICATOR	REQUIREMENT
7.5.1. Nitrogen effluent load per ton of crustacea produced over a 12-month period (see Appendix IX).	<p><i>P. monodon</i>; <32.4 kg N/T</p> <p><i>P. vannamei</i>; <25.2 kg N/T</p> <p><i>Cherax spp.</i>, <i>Procambarus spp.</i>, <i>Astacus spp.</i>; <26.1 kg N/T</p> <p><i>Macrobrachium spp.</i>: <39.2 kg N/T</p>
7.5.2. Phosphorous effluent load per ton of crustacea produced over a 12-month period.	<p><i>P. monodon</i>; <5.4 kg P/T</p> <p><i>P. vannamei</i>; <3.9 kg P/T</p> <p><i>Cherax spp.</i>, <i>Procambarus spp.</i>, <i>Astacus spp.</i>: <4.0 kg P/T</p> <p><i>Macrobrachium spp.</i>: <6.1 kg P/T</p>
7.5.3. Responsible handling and disposal of sludge and sediments removed from ponds and canals.	No discharge or disposal of sludge and sediments to public waterways and wetlands.
7.5.4. Treatment of effluent water from permanently aerated ponds.	Evidence that all discharged water goes through a treatment system ⁸⁵ , and concentration of settleable solids in effluent water < 3.3 mL/L. ⁸⁶

⁸⁵ Settling basins need to comply with characteristics given in Appendix IX.

⁸⁶ The settleable solids concentration at the outlet of the effluent treatment system must be measured at the beginning and at the end of the pond draining period when that period is less than 4 hours. For ponds draining more than 4 hours monitoring should be done in 6-hour intervals. For situations with a retention time of several days, monitoring should be done at a time after harvest equal to the hydraulic retention time of the treatment system. Settleable solids are measured as the

<p>7.5.5. Percentage change in diurnal dissolved oxygen (DO) relative to DO at saturation in receiving water body⁸⁷ for the water's specific salinity and temperature.</p>	<p>≤ 65%</p>
<p>7.5.6. Water-quality monitoring matrix completed and submitted to ASC (see Appendix X)</p>	<p>Yes</p>

Rationale - This criterion addresses the issues regarding the emissions of contaminants from shrimp farms and their effects on receiving water bodies.

Nitrogen and phosphorus loads

Nitrogen (N) and phosphorus (P) are the key nutrients to control to reduce the risk of eutrophication of receiving water bodies. Water discharged from crustacean farms cannot be expected to have equal or better quality than receiving water bodies. Thus, there must be an allowance for the discharge of a portion of the N/P applied to ponds, and farmers need to demonstrate compliance with national wastewater regulations through adequate monitoring. However, the ecological impact of effluents is also related to the total quantities of N and P released from the culture system (defined as the nutrient load). In typical culture systems in earthen ponds with a daily water exchange of 10% or lower, N/P loads in effluents are equal to approximately 30% and 20% of N and P inputs, respectively. Nitrogen content of feed can be calculated based on the assumption that proteins contain 16% N.

Sludge disposal

Intensive culture ponds and settling ponds and canals usually accumulate sludge and sediments that need to be removed periodically. The best way to dispose of saline sediment is to place it on the insides and tops of pond embankments after drying on pond bottom or in dedicated areas of the farm where sludge is extracted

volume of solids that settles to the bottom of a conical cone (Imhoff cone) in 1 hour. Use of more sophisticated methods such as spectrophotometer readings is also permitted.

⁸⁷ Measured at a station at least 200m down current from the farm outfall.

from ponds or canals. Alternatively, the best disposal sites have saline soil and, especially, are in areas without surface or underground freshwater bodies.

Effluent treatment

Crustacean ponds, like ponds for most other aquaculture species, are drained for harvest. The usual method employed for large extensive, and semi-intensive ponds is to release water through a gate with the water level established by dam boards. The ponds are drained by removing dam boards, allowing the water to flow out from the surface of the pond. Thus, effluent quality is identical to pond water quality for most of the drawdown period.

Soil particles and organic matter accumulate in the bottom of aerated ponds. This results from the erosion of pond bottoms by aerator-generated water currents and sedimentation of these particles in areas of the pond where water currents are weaker. Plastic-lined ponds are a special case. The aerators do not erode the bottom, but they force the coarser particles of uneaten feed, dead plankton, etc. to settle in the centre of ponds. When ponds are drained, the recently accumulated wastes are relatively fluid and tend to be lost in outflowing water (Boyd, 1995; Boyd & Tucker, 1998). There is less erosion of the bottoms of semi-intensive and extensive ponds because aerators are not used. Particles settle over the entire pond bottom rather than being concentrated in small areas by aerator action. Thus, the sediment from intensive ponds is of lower density (more fluid) and more enriched in organic matter than sediment in semi-intensive and extensive ponds. Pond water from intensive culture usually carries a high load of nutrients and suspended solids. Workers also enter the pond with nets or seines, which further disturbs the sediment. Moreover, intensive ponds are often drained using pumps. For these reasons, the ASC Shrimp Standard requires wastewater treatment for intensive ponds but not for semi-intensive or extensive ponds.

A settling basin can improve the quality of effluent from intensive farms. Although settling basins are not effective in removing plankton, detritus, or colloidal clay particles from water, they are effective in removing larger particles (Boyd & Queiroz, 2001; Ozbay & Boyd, 2004). About 100% of settleable solids (SS), 90% of total suspended solids (TSS), 60% of biological oxygen demand (BOD), 50% of phosphorus and 30% of nitrogen in draining effluent can be removed by sedimentation in a basin with a hydraulic retention time (HRT) of six hours or more (Teichert-Coddington *et al.*, 1999). The settling basin should have a volume of at least 1.5 times the minimum six-hour HRT volume to have the sediment storage capacity necessary to maintain the six-hour HRT.

The measurement of SS rather than total TSS in effluent water quality monitoring is required because SS can be measured easily and represents the fraction of the TSS that will settle out fairly rapidly. Settleable solids are the environmentally harmful fraction of the TSS, as they are the source of most of the turbidity and

sediment, and a lot of organic matter and phosphorus are associated with the solids (Boyd, 1978). Removal of SS from water will lower the BOD and total phosphorus concentration. The determination of SS is a simple and inexpensive analysis. A limit of 3.3 millilitres per litre of settleable solids was defined for discharge permits in the United States after the first USEPA study of aquaculture facilities in the mid-1970s (EPA, 1974).

Effect on receiving water bodies

The ASC Shrimp Standard addresses the cumulative impact of crustacean farms on receiving water bodies. The most characteristic feature of eutrophication is wide, daily excursions in dissolved oxygen concentration resulting from the large abundance of algae and other microorganisms. Therefore, the ASC Shrimp Standard uses the diurnal dissolved oxygen (DO) fluctuation as a practical parameter for determining the effects of eutrophication on a particular water body. Oxygen levels in water fluctuate over a 24-hour cycle in relation to the level of photosynthesis and respiration taking place. 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 by-product 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, which results in a decrease in DO. The larger the population of primary producers, the more oxygen is consumed. The level or effects of eutrophication can thereby be expressed in the difference between peak daytime oxygen levels and the reduced oxygen levels during the night. Minimizing excessive fluctuations between daytime and night-time DO levels is of critical importance to aquaculture operations to maintain fish health and productivity.

Indicator 7.5.6 requires farms to submit to the ASC the results of the effluent monitoring they conduct as a part of their regulatory requirements. In particular, the requirement requires data on any sampling of phosphorous, nitrogen, TSS and BOD. This data will help to distinguish the performance of farms certified by this requirement over time and assist in the revision of the requirement.

Guidance for Implementation

7.5.1 and 7.5.2: N and P contents of inorganic fertilizers should be indicated on fertilizer bags. In the case of organic fertilizers, N and P contents need to be provided by the manufacturer. Nitrogen content of feeds can be calculated from the declared protein content using the following formula:

$$N \text{ content (\%)} = \frac{\text{Protein content (\%)}}{6.25}$$

Phosphorus content of feeds needs to be provided by the feed manufacturers.

7.5.3: Sediment disposal sites should be surrounded by embankments to avoid runoff and, if they are in areas with highly permeable soil or in a freshwater zone, they should be lined with clay or plastic to avoid infiltration. Embankments should be 0.75 metres high and twice as large as the area needed for the volume of sediment to be stored so that at least half (0.375 metres) of the storage height for rainfall would be available. This amount of extra storage volume would capture the rainfall from the 100-year rainfall event in most areas and prevent runoff from the stockpiled sediment.

7.5.4: Alternatives to settling basins for effluent treatment

Farms that do not have enough space for a settling basin can use production ponds adjacent to the pond being harvested as settling basins. Another alternative is to use drainage canals as settling basins, where sills can be installed at intervals in the bottoms to trap sediment. The use of production ponds and drainage canals as settling basins allows for the treating and recycling of all the water from harvested ponds is encouraged. Alternatively, grassed strips or vegetated ditches or other artificial wetlands can be used for treating pond effluents. Suspended solids and other wastes are removed as the effluent passes over or through the vegetation.

7.5.5: Dissolved oxygen (DO) concentration must be measured in the receiving water body 0.3 metres below the water surface one hour prior to sunrise and two hours prior to sunset (temperature and salinity must also be recorded at the time of DO measurements). Dissolved oxygen values must be expressed as a percentage of saturation, and the difference between sunset and sunrise values (diurnal DO fluctuation) must be calculated. Measurements must be made at least twice a month and can be made as frequently as daily. In the case of coastal waters influenced by tides, dates must be chosen such that the measurement time (one hour prior to sunrise and two hours prior to sunset) corresponds to high and low tides, to reflect variations related to the tidal regime. The annual mean diurnal DO fluctuation shall be less than 65%.

Crustacean farms may discharge into channels or streams connected to larger, open water areas of a river or estuary. The sampling site for DO concentration in the receiving water for a particular farm should be in the segment of the water system into which effluent is directly discharged. Sampling stations should be outside of the zone where mixing is not yet complete, and concentrations of some water quality variables would be elevated above ambient for the receiving water. There are several complicated methods for determining the area of the mixing zone, none of which were considered practical for use in an eco-label certification program (USEPA, 2003). Thus, aside from making measurements at a site, there is no way of determining the extent of the mixing zone. Experience suggests that the mixing zones for shrimp farm effluents, in which the concentrations of some water

quality variables may be higher than ambient concentrations, usually do not extend more than 100 or 200 metres into estuarine water bodies (Boyd, pers comm.). Of course, the mixing zone could be roughly delineated by a relatively simple procedure. Crustacean farm effluents are seldom of the same turbidity as receiving waters. Thus, Secchi disk visibility measurements could be made at 25-metre intervals downstream of the farm outfall and points beyond the distance at which the Secchi disk readings becoming constant would be outside of the mixing zone.

On some farms where effluents are discharged directly into the sea, it would be difficult to sample offshore when waters are rough. In this case, the sample could be taken at some point at least 200 metres from the outfall, but near the shore to avoid a dangerous situation related to sample collection.

Farms that can demonstrate that concentrations of total N and total P in discharged water are lower than in the receiving water body or have not discharged any water since the last audit (or for the last 12 months in the case of the first audit) through the use of water recirculation techniques, would be exempt from complying with this indicator.

Criterion 7.6 Energy efficiency

INDICATOR	REQUIREMENT
7.6.1 Energy consumption by source over a 12-month period.	Records available for all activities.
7.6.2 Annual Cumulative Energy Demand (CED) (mega joules/ton of shrimp produced) over a 12-month period.	Records available for verification of calculations.

Rationale - Energy is consumed throughout the culturing, harvesting, processing and transportation stages of crustacean production. There are other energy drains to consider, such as the construction of facilities, maintenance and updating of facilities, the production of construction materials, and during the production of fertilisers and other inputs. The ASC Shrimp Standard acknowledges that, currently, there is insufficient data available for setting energy use threshold. Therefore, the ASC Shrimp Standard requires the collection of energy consumption data by audited farms to set energy use thresholds in the future. To be useful, data collection needs to be as detailed as possible.

Guidance for Implementation

7.6.1: Records of quantities of energy consumed must be kept by type of energy source: diesel, gasoline, natural gas, electricity, etc.

Only activities carried out on the farm site are considered. Transport of crustaceans to and from the farm site and transport of personnel to and from farm site are not included. Farms must record energy consumptive activities, including: water aeration, water pumping, office power, internal transportation, etc.

7.6.2: For calculating the annual CED, cumulative energy use over 12 months must be converted from current units to converted to mega joules⁸⁸ which is then divided by the farm production over the same 12-month period.

⁸⁸ <https://www.eia.gov/energyexplained/units-and-calculators/energy-conversion-calculators.php>

Criterion 7.7 Handling and disposal of hazardous materials and wastes

INDICATOR	REQUIREMENT
7.7.1. Safe storage and handling of chemicals and hazardous materials. ⁸⁹	Evidence of procedures in place.
7.7.2. Responsible handling and disposal of wastes based on risk assessment and possibilities of recycling.	Evidence of procedures in place.

Rationale - The construction and operation of crustacean farms often involve the use of hazardous chemicals (e.g., combustibles, lubricants and fertilisers) and the generation of wastes, some of which are classified as hazardous. The storage, handling, and disposal of such hazardous materials and wastes must be done responsibly, according to the relevant legislation and t potential impacts on the environment and human health. Farms must implement management plans to address the potential risks on-site and through disposal.

Guidance for Implementation

7.7.2: Wastes must be managed in compliance with local regulations when they exist. In all cases, wastes must be managed in a way that is safe for human health and the surrounding environment (especially natural waters). When appropriate facilities for waste disposal are absent in the area, crustacean farms may bury non-hazardous solid wastes on-site, provided all precautions have been taken to prevent the contamination of surrounding surface and ground waters. Non-

⁸⁹ Bunds (waterproof wall and floor built around tanks of oil or other hazardous liquids to contain them in the event of a spillage) must be built around combustible storage containers to contain any spills. Bunds must be waterproof, with a capacity of 110% of the volume of stored material and must not have a drain (rainwater needs to be pumped or scooped out periodically). 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 authorised personnel.

organic wastes must not be burned on-site due to their potential emissions of toxic gases.

Accredited waste management companies must be used where available. However, the ASC Shrimp Standard appreciates that crustacean farms are frequently located in areas where accredited waste management companies are not established or accessible. Farmers must demonstrate the use of the most responsible disposal solutions based on what is locally available. Where hazardous biological wastes exist, including crustacean offal and mortalities, they must be managed according to a plan based on potential risks and national and/or international guidelines, when they exist, and solutions must be identified for the disposal of hazardous non-biological wastes, including used lubricants and chemical containers.

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 is encouraged. When selling recyclable wastes to a local collector, the final destination of wastes shall be specified. The income generated by the sales of recyclable wastes should be used for providing incentives to employees for separating wastes and increasing the amount of recycling done on the farm.

Appendix I: Outline for a B-EIA

Biodiversity-Inclusive Environmental Impact Assessment

This appendix explains the “biodiversity-inclusive” Environmental Impact Assessment (B-EIA), the different types of B-EIA that can be implemented, the benefits of B-EIA to farmers, the role of B-EIA in farm planning and management and outlines the basic steps in a B-EIA. This appendix also outlines a method for applying a B-EIA relative to the scale or size of the farm. Finally, it suggests a key checklist for farmers to follow to help them complete the B-EIA process and to help auditors verify it.

Definition:

The International Association for Impact Assessment (IAIA, 2009) define an Environmental Impact Assessment as: *“the process of identifying the future consequences of a current or proposed action. The ‘impact’ is the difference between what would happen with the action and what would happen without it”* (p. 1).

The B-EIA process seeks to obtain the best possible biodiversity outcomes from land use changes. It is important that all interested parties understand the process by which the assessment has been made. The plan shall outline actions to deliver biodiversity objectives, persons responsible, and implementation and monitoring programs. The B-EIA must provide reliable information about, and interpretation of, the ecological implications of the project from its inception to its operation and, where appropriate, its decommissioning. The B-EIA process seeks to add value to ASC Shrimp Standard and contribute to demonstrating compliance, while considering specific local landscape conditions.

B-EIA assessment team

The B-EIA shall be carried out by a nationally accredited body. Where no accredited body exists, farms must ensure that the B-EIA team consists of competent and qualified environmental scientists, biologists, or ecologists with a minimum of a Master of Science degree from a university.

The role of ecologists and practitioners in the B-EIA team will be to:

- provide an objective and transparent assessment of the biodiversity and potential (in the case of new projects) or known (in the case of existing operations) ecological effects of the farm to all interested parties, including the general public;

- facilitate an objective and transparent determination of the farm in terms of its compliance with national, regional, and local conservation and biodiversity policies; and
- set out what steps must be taken to adhere to the requirements relating to designated sites and legally protected areas as encompassed in the ASC Shrimp Standard.

B-EIA Statement

The B-EIA Outline in Appendix I follows best practices as outlined by the IAIA and the Institute for Environmental Assessment (IAIA, 1999), The Espoo Convention (UNECE, 1991), minimum content of an EIA and the Convention on Biodiversity, which has outlined the main content and process for B-EIAs (CBD 2005). The BEIA should be consistent with the other criteria in the ASC Shrimp Standard and carried out in conjunction with the Social Impact Assessment outlined in requirement 3.1.

The B-EIA process must be replicable and able to respond to increasing advancements in farming practices and relevant scientific knowledge as it evolves. It is also a “partnership” process, which is most effective if all relevant ecologists and other specialists work in collaboration. The B-EIA can be dovetailed with the p-SIA (Principle 3) by having one stakeholder meeting at the beginning of the process, and a second close to the end. If this method is followed, an ecologist would organize a local stakeholder meeting at the beginning of the B-EIA process and ask the following questions: What ecological and natural resources related effects should I watch for? What natural resources are vital to your community? Before writing the final report the ecologist should again organise a stakeholder meeting and validate his/her findings with the stakeholders by asking questions such as: Did I capture it all? Can you comment on my findings?

The B-EIA will provide the means of gaining an understanding of the findings and support for its proposals from non-specialists by clarifying the past and current impacts of any farming operation.

Basic B-EIA Methodology

Screening - to determine if a proposal should be subject to BEIA and, if so, at what level of detail.

- Use biodiversity-inclusive screening criteria to determine whether important biodiversity resources may be affected.
- Biodiversity screening “triggers” for an IA must include:

- Potential/actual impacts on protected areas and areas supporting protected or Red List species.
- Impacts on other areas that are not protected but are important for biodiversity and biodiversity services, including extractive reserves, indigenous people's territories, wetlands, fish breeding grounds, soils prone to erosion, relatively undisturbed or characteristic habitat, flood storage areas, groundwater recharge areas, etc. (i.e., HCVAs). Activities posing a particular threat to biodiversity (in terms of their type, magnitude, location, duration, timing, and reversibility).
- Encourage the development of a biodiversity screening map, indicating important biodiversity values and ecosystem services. If possible, integrate this activity with the National Biodiversity Strategy and Action Plan (NBSAP) and/or biodiversity planning at sub-national levels (e.g., regions, local authorities, towns) to identify conservation priorities and targets.
- Existing farms with previous EIAs that can demonstrate compliance to the B-EIA framework set out in Appendix I (i.e., the tasks set out in the checklist have been completed) shall provide that information for the consideration of the auditor without necessarily the need of a new full B-EIA.

Scoping – to identify the issues and impacts that are likely to be important and to establish terms of reference for the B-EIA. Scoping leads to the Terms of Reference for an IA, defining the issues to be studied and the methods that will be used. Scoping can be used as an opportunity to raise awareness of concerns relating to biodiversity and discuss alternatives to avoid or minimise negative impacts on it.

The scope developed shall address the following issues (based on existing information and any preliminary surveys or discussions):

- The farming method, possible alternative methods and a summary of activities likely to affect biodiversity.
- An analysis of opportunities and constraints for biodiversity, including “no net biodiversity loss” or “biodiversity restoration” alternatives.
- Expected or already experienced biophysical changes (in soil, water, air, flora, fauna) resulting from activities or proposed activities or induced by any socioeconomic changes.
- The spatial and temporal scale of influence, identifying effects on connectivity between ecosystems and potential cumulative effects.

- Available information on baseline conditions prior to an existing farm and any baseline conditions for proposed farms along with anticipated trends in biodiversity in the absence of the farm.
- Likely biodiversity impacts associated with the farm operation in terms of composition, structure, and function.
- Biodiversity services and values identified in consultation with stakeholders and anticipated changes in these, highlighting any irreversible impacts.
- Biodiversity services and values identified in consultation with local experts (without a vested interest in the area in question) and anticipated changes in these, highlighting any irreversible impacts.
- Biodiversity services and values identified in consultation with stakeholders and anticipated changes in these, highlighting any irreversible impacts.
- Possible measures to avoid, minimize or compensate for significant biodiversity damage or loss, referring to any legal requirements.
- Information required to support decision making and a summary of important gaps. Proposed IA methodology and timescale.

Impact study and preparation of IA – to identify impacts and clearly document the proposed measures for mitigation, the significance of the effects, and the concerns of the interested public and the communities affected by the proposed farm or the already existing farm.

Address biodiversity at all appropriate levels and allow for enough survey time to take seasonal variability into account. Focus on processes and services that are critical to human well-being and the integrity of ecosystems. Explain the main risks and opportunities for changes in biodiversity as a result of farmer activities.

The B-EIA should address all issues identified under requirements 2.1.1, 2.2.2, 2.3.1, 2.3.2, 2.4.1-2.4.3, 2.5.3, 2.5.4, 6.1.2.

Farms sited after 1999 are required, through the B-EIA, to prove through aerial photography, satellite imagery, GIS, historical data or records, and community and non-owning farmer testimonials that the current farm did not cause mangrove deforestation or natural wetland alteration as per requirement

A B-EIA must identify critical habitats for all species-at-risk on the proposed site and protect these areas (requirement 2.2.2). The first requirement is that farmers are aware of the different species on their farm. Large farms (>15 ponds or >25 hectares in total production area) shall seek an expert opinion while small farms

may consider including local stakeholders. The B-EIA must also assess risks associated with 25-year storm or flood risk. B-EIAs shall determine, through national agency records and direct monitoring, the organisms present on farms including the largest animals known to have occurred within 10 years and 50 km of a farm. Corridors shall be designed to allow free passage of such animals. The B-EIA will allow the farmer to demonstrate compliance. The B-EIA must address requirement 2.4.1 (i.e., determine the width of the buffer zones). The B-EIA must evaluate impact of the farm on surrounding water ways (requirement 2.5.1) and identify suitable monitoring procedures to demonstrate no impacts on freshwater. The B-EIA should identify the location of the sampling stations and the frequency of monitoring for measuring the specific conductance of soil in adjacent land ecosystems and agricultural fields (requirement 2.5.4).

Review for decision making – To approve or reject the proposal for establishment or expansion of an existing farm, to establish the terms and conditions for its implementation (in the case of a future project) or to determine necessary terms for mitigation and/or offsetting impacts. The auditor will verify that final decisions regarding the project’s development, mitigation and compensation measures are justified and consistent with the required outcomes of the B-EIA.

Mitigation and offsetting – The B-EIA must define appropriate mitigation and offsetting requirements given previous impacts. - Remedial action can take several forms, including avoidance or prevention, mitigation and compensation, or offsetting (e.g., restoration and rehabilitation of sites). Apply the “positive planning approach,” where avoidance has priority and compensation is used as a last resort measure. Acknowledge that compensation will not always be possible and there will still be cases where it is appropriate to say “no” to new farms or expansion of existing farms on the grounds of irreversible damage to biodiversity.

Review and decision-making – Local government and at least one civil society organization chosen by the community shall receive a copy of the B-EIA and related management documents. The B-EIA must be made available to all stakeholders and any interested party for review. Any comments must be taken into consideration prior to finalizing mitigation and compensation measures to be implemented. A peer review of environmental reports regarding biodiversity shall be undertaken by a specialist with appropriate expertise, where biodiversity impacts are significant. The involvement of affected groups and civil society is required. This can be done by presenting the B-EIA and the pSIA to the community for discussion. Avoid pitting conservation goals against development goals, balance conservation with sustainable use for economically viable and socially and ecologically sustainable solutions. For important biodiversity issues, apply the precautionary principle where information is insufficient. In all cases, apply the no-net-loss principle in relation to irreversible losses associated with the proposal (e.g., building pumping stations).

Management, monitoring, evaluation, and auditing – It is important to recognize that predicting the effects of ecological disturbance on biodiversity is uncertain, especially over long timeframes. Management systems and programs, including clear management targets (or Limits of Acceptable Change (LAC)) and appropriate monitoring, shall be set in place to ensure that mitigation is effectively implemented, unforeseen negative effects are detected and addressed, and any negative trends are detected. Provision shall be made for regular auditing of impacts on biodiversity and, emergency response measures., Contingency plans shall be in place where upset or accident conditions could threaten biodiversity. Farms shall monitor neighbouring mangrove areas to ensure that negative impacts are not occurring. Factors to consider in mangrove assessments include changes in the total area of mangroves, changes in species diversity, presence of dead or dying trees, freshwater impoundment, saline water intrusion, sedimentation, hydrological changes and use of mangroves by local people (Boyd, 2002).

Applying B-EIAs on existing, expanding, and new farms

The methodology for a B-EIA remains the same regardless of whether a farm is new, expanding or existing. The recognition of dependencies and impacts (positive and negative) remains the same.

For new farms and farm expansion, the focus of this criterion lies in assessing future risks and impacts. This assessment must be done before the farm's establishment. For existing farms, the focus lies in assessing actual (previous and current) dependencies, risks, and impacts. In any case, the outcome is oriented towards identifying how to responsibly address these risks and impacts in accordance with the requirements in this document. Avoiding unwanted impacts may be more difficult on existing farms, whereas a need to compensate affected stakeholders for negative impacts on biodiversity may be less when plans for a future operation can still be adjusted. All farms built after the publication of this Standard must have carried out a B-EIA following the guidance and notes in this Appendix prior to the establishment of the farm.

Applying B-EIA relative to scale or size of farm

The following guidelines discuss how large and small farms may require different levels of support when performing a B-EIA.

Large farms or groups of farms (>15 ponds or >25 hectares in total production area) will need professional expertise to undertake a B-EIA, due to the more significant impacts of conversion or operation on ecosystems, and resource use and disposal. Hiring a small team (e.g., a senior ecologist coordinator and junior researcher(s)) with relevant academic expertise will be required.

Medium-scale farms or groups of small farmers (6-15 ponds but ≤ 25 hectares in total area) or individual small farms (≤ 5 ponds and < 5 hectares) may be able to do a credible B-EIA through a consultancy service of an academic ecologist or a conservation civil society organization in or familiar with the area and its ecosystem. One person may be able to plan, implement and report such a B-EIA.

For cooperatives or groups of farms in the same area, the composition of the cooperative/group determines what structure and resources a B-EIA will require. The group or cooperative must be bound on a legal basis (e.g., a registration of membership or a documented commitment to work together under a common set of rules or contract) and share a geographic location or geophysical resource (e.g., a water system).

Cooperatives or clusters of small farms are considered as one “small farm” in the context of a B-EIA if the group engages in group certification together is not bigger than 25 member farms and minimally 75% of the total production capacity of the cooperative/cluster comes from small-scale farms. All other groups, cooperatives or clusters can, in group certification and regarding the B-EIA, only be considered as a large-scale entity.

In summary, the full overview of B-EIA methodology is adapted to the scale of the farm or group of farms as follows in the table below:

Farm Scale	B-EIA methodology
<p>Single small-scale to medium-scale farms or cluster/cooperative of no more than 25 member farms with at least 75% of production coming from small-scale farms applying for group certification:</p> <p>A small-scale farm is defined as having a maximum of 5 ponds, but the total production area is no larger than 5 hectares.</p> <p>A medium-scale farm is defined as 6-15 ponds but having a total production area no larger than 25 hectares.</p>	<p>B-EIA done by an academic ecologist /NGO consultant using guidance framework and methodology.</p>

<p>Single large-scale farms or cluster/cooperative of farms including a large-scale farm or of more than 25 small-scale farms, or with more than 25% of production coming from medium-scale farms applying for group certification.</p> <p>A large-scale farm is defined as having more than 15 pounds or having more than 25 hectares of total production area.</p>	<p>B-EIA done by an accredited professional expert and based on guidance framework.</p>
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Auditing a B-EIA

In auditing for this criterion, auditors need to look for the completeness of a B-EIA report and verify the way the farm owner/operator followed the recommendations in the B-EIA, discussing these openly with stakeholders and where necessary seeking to come to mutually agreeable terms to resolve concerns. Auditors need to review documentation to determine if it is appropriate and disseminated (i.e., is it informative, is it complete as to the steps outlined above, is it available both to the local government and the community and it lists dates of meetings and names of participants). Auditors should confirm with some participants to find out if the information is indeed available to them (i.e., do they have a copy, did they proofread a draft for comments, were comments they made reflected in the final draft?) and it should be determined if they agree with the outcomes/conclusions the documentation lists (i.e., are listed issues and negotiation points indeed the issues and negotiation points agreed to by all parties?).

Auditors will verify the B-EIA announcement, draft, final report and summary are locally disseminated and distributed according to the above checklist. A cross-check of local government and stakeholder participants will be conducted at random to determine if information on the B-EIA process was available and that any suggestions made by stakeholders were reflected in the final report.

To determine compliance with this criterion, auditors need not verify the accuracy, robustness or quality of the data gathering in a B-EIA report, nor will auditors need to assess impacts, as the B-EIA report will already provide this information.

Suggested checklist for farmers and guideline for auditors on a complete B-EIA process and report

	Validated	To be improved
1. Quality of the B-EIA process (e.g., was it participatory and transparent?); B-EIA carried out by a valid expert in accordance with the above table.		
(b) The B-EIA was publicly (locally) communicated with sufficient time for interested parties to participate and/or get informed.		
(c) Stakeholders are listed, and impact descriptions are documented. Meetings with the listed stakeholders (or by stakeholders chosen representatives) have taken place.		
(d) Meetings have been recorded and the minutes are attached to the final report, including names and contact details of participating stakeholders.		
(e) Evidence is provided that draft and final B-EIA reports have been submitted to local government representatives and, if requested by stakeholders, a legally registered civil organization chosen by these stakeholders.		
(f) Evidence is provided that the final B-EIA reports have been submitted and reviewed by a specialist with appropriate expertise on biodiversity issues.		

<p>(g) B-EIA completed according to guidance on B-EIA and p-SIA relationship (transparency and consultation).</p>		
<p>2. Risk analysis: actual (past and present) impacts of the current farms, or potential impacts of the intended farm or expansion of existing farm and at least two alternatives (one of these is the “no farm or no expansion” scenario). Concepts to cover include:</p>		
<p>(a) The type of farming, possible alternatives, and a summary of activities likely to affect biodiversity.</p>		
<p>(b) An analysis of opportunities and constraints for biodiversity (include “no net biodiversity loss” or “biodiversity restoration” alternatives).</p>		
<p>(c) Expected biophysical changes (in soil, water, air, flora, and fauna) resulting from proposed or existing activities or induced by any socioeconomic changes.</p>		
<p>(d) Spatial and temporal scale of influence, identifying effects on connectivity between ecosystems, and potential cumulative effects.</p>		
<p>(e) Available information on baseline conditions and any anticipated trends in biodiversity in the absence of the proposal.</p>		
<p>(f) Likely biodiversity impacts associated with the proposal or current operations in terms of composition, structure, and function of surrounding ecosystems.</p>		
<p>(g) Biodiversity services and values identified in consultation with stakeholders and anticipated</p>		

magnitude, direction, and timeline of changes in these (highlight any irreversible impacts).		
(h) Possible measures to avoid, minimize or compensate for significant biodiversity damage or loss, referring to any legal requirements. Information required to support decision making and summary of important gaps.		
(j) Proposed IA methodology and timescale.		
3. Impact statement is available and contains all the requirements listed above along with a clear indication of authors and affiliations.		
4. Review process, reviewers (decision makers), and decisions clearly documented.		
5. Clear understanding as to how options for mitigation and offsetting were determined and how avoidance actions were prioritized over compensation.		
6. Names, affiliations and experience of the reviewing specialist are documented. A clear understanding of how affected groups were involved and how balanced consideration was given to conservation vs. development goals in the peer review is documented.		
7. Clear articulation of a biodiversity management system including targets and monitoring strategies for mitigation.		

For further background information on B-EIA processes, see IAIA, 2009 or FAO, 2009.

Appendix II: Site and receiving water checklist

Table 1. Receiving Water Information Checklist and Evaluation (Requirement 2.1.2).

Information.	Validation	Present/Absent (√ or X)
Dates of farm establishment and expansion.	dd/mm/yyyy	
Size of farm operation being audited (hectares).	Ha	
GPS Coordinates of farm being audited.	List coordinates	
Satellite imagery of farm.	Attach satellite images	
Schematic of farm with specific locations of all water inlets and outfalls.	Attach schematic	
Receiving water system type (riverine, estuarine, etc.)	Specify	
Major characterization studies (excluding EIAs, see below) conducted pertaining to the receiving waters or specific activities conducted on the	List and attach copies of these studies	

receiving watershed, if any (published or non-published).		
Description of the major activities (beyond your operation) impinging on 2.6.1 the receiving watershed.	List and attach copies explaining activities	
Environmental Impact Assessment(s) for initial farm siting and for expansion.	Attach documents	
Other pertinent information regarding the receiving waters and any effect of farm activities.	Attach documents	
Stewardship activities to protect the receiving watershed from pollution.	List or attach copies explaining in detail stewardship activities	

Appendix III: Guidance for mangrove restoration

This guidance is meant to help farmers and crustacean producers understand what is meant by ‘mangrove restoration’, describe the benefits of restoration to farmers, to outline the basic steps involved in mangrove restoration, the role mangroves could play in farm planning and management. This guidance gives a brief overview of the types of expertise required when carrying out mangrove restoration, and the types of institutions who could help with this task. It also includes a checklist to enable farmers to complete the ASC Shrimp Standard requirements, and for auditors to verify this.

Ecosystem conservation and restoration is indicated in several criteria in the ShAD, in particular Criteria 2.2, which requires farmers to “restore equivalent areas converted for pumping stations and inlet/outlet canals”. For “farms built or permitted before May 1999 in mangrove areas, farmers are required to compensate/offset impacts via restoration as determined by the B-EIA, national/state/local authority plans/list, or 50% of the affected ecosystem (whichever is greater)”. Farmers are also required under criterion 2.4 to “maintain ecological buffers, barriers and corridors”. This may also require restoration work to comply with the Standard.

Mangrove restoration: the benefits to farmers

Healthy mangroves can generate income and resources for farmers and at the same time offer protection to extreme events such as storms, and more gradual processes such as saltwater intrusion and shoreline erosion, provided they are present in large enough areas.

Nearshore and offshore fish and shrimp catches increase and diversify with the increasing presence of mangroves in the inter-tidal zone. Mangroves also provide habitats and serve as nursery grounds for the juveniles of aquatic organisms on which near and offshore fisheries are based. Increased fish and shrimps catch can function as an extra income for the farmers themselves or through a local payment scheme can generate income for the landowner who restores mangroves of which local fishermen benefit.

Mangroves are primarily used for timber and firewood. Secondary products, including bark (for tannin), leaves (fodder and vegetables), fruits (to make beverages), honey, wax, and thatching material as well as finfish and shellfish are also collected from mangrove ecosystems.

Protection of mangrove ecosystems can avoid large amounts of greenhouse gas emissions and promote continued sequestration of carbon from the atmosphere. Farmers who agree to protect or restore mangrove ecosystems may benefit from the existence of emissions credit schemes in which polluters pay for that ecosystem protection to help offset their own emissions.

Mangrove restoration methods

The following five ecological principles, considerations and practical suggestions are based on a well-established process called "Ecological Mangrove Restoration" (Macintosh, Mahindapala & Markopolulos, 2012), building on lessons learned from rehabilitation attempts worldwide (Erftemeijer & Lewis, 2000; Lewis, 2001; Primavera & Esteban, 2008).

1. Understand the ecology of the mangrove species at the site, in particular the patterns of reproduction, propagule distribution, and successful seedling establishment.
2. Understand the hydrologic patterns (the depth, duration, and frequency of tidal inundation) that control the distribution and successful establishment and growth of (targeted) mangrove species.
3. Assess modifications of the original mangrove environment that currently prevent natural regeneration (recovery after damage).
4. Restore hydrology and other environmental conditions that encourage natural recruitment of mangrove propagules and successful plant establishment. For example, rehabilitation of creeks or removal of small dams further inland can ensure appropriate tidal inundation characteristics and sufficient freshwater flow towards the mangrove stands (Lewis, 2005). Where human modifications of the coast include large-scale conversion of mangroves to aquaculture ponds, restoration of these ponds back to mangroves, through hydrological restoration, e.g., by partial removal of pond dikes, should be considered. This will also assist with coastal stabilization by providing erosion protection from storm waves (Stevenson *et al.*, 1999; Lewis, Erftemeijer & Hodgson., 2006, Winterwerp, *et al.* 2013).
5. Only consider actual planting of propagules, collected seedlings, or cultivated seedlings after determining (through steps 1-4) that natural recruitment will not provide the quantity of successfully established seedlings, rate of stabilization, or rate of growth of saplings established as objectives for the restoration project.

Wetlands International offers a manual with guidance on mangrove planting.⁹⁰:

Challenges of successful mangrove restoration

Much of the effort to restore coastal greenbelts involved simple planting of mangrove seedlings and propagules. There have been numerous failures due to planting of inappropriate species, and in inappropriate locations.

Failure occurs, in general, due to a lack of understanding of the restoration site itself:

- What was its history?
- What mangrove species grew there?
- Where did they grow?
- What caused the destruction or degradation of the mangroves?
- What were their hydrological requirements?
- How deep was the substrate in which they grew?
- What were the freshwater inputs to the area?
- Where did exchange of tidal and sea water take place?

Priority areas for mangrove restoration

Farmers should focus their mangrove restoration efforts in order of priority:

1. Areas regulated by local or national regulation – the nearest potential green belt or riparian strip.

When the mangrove greenbelt functionality is restored, and the riverine mangrove functionality is restored:

2. Integrated with traditional and extensive aquaculture systems, through a silvofishery approach.

Where several smallholders together restore an area, they should strive for maximum connectivity between mangrove plots to maximize the functionality of the ecosystem.

⁹⁰ <https://www.wetlands.org/publications/mangrove-restoration-to-plant-or-not-to-plant/>

Suggested checklist for farmers on a complete Mangrove Restoration process and report

	Validated	To be improved
Understand the ecology of the mangrove species at the site, in particular the patterns of reproduction, propagule distribution, and successful seedling establishment.		
Understand the hydrologic patterns (depth, duration and frequency of tidal inundation) that control the distribution and successful establishment and growth of (targeted) mangrove species.		
Assess modifications of the original mangrove environment that currently prevent natural regeneration (recovery after damage).		
Restore hydrology and other environmental conditions that encourage natural recruitment of mangrove propagules and successful plant establishment.		
Only consider actual planting of propagules, collected seedlings, or cultivated seedlings after determining (through steps 1-4) that natural recruitment will not provide the quantity of successfully established seedlings, rate of stabilization, or rate of growth of saplings established as objectives for the restoration project.		

Relevant institutions and programs - internationally and nationally:

- Wetlands International⁹¹
- IUCN - Mangroves for the Future program⁹²
- IUCN – Commission on Ecosystem Management (CEM): Restoration Thematic group⁹³
- Society for Ecological Restoration⁹⁴
- GIZ CZM SocTrang⁹⁵
- Mangrove Action Project⁹⁶

Further reading:

- Best Practice Guidelines on Restoration of Mangroves in Tsunami Affected Areas⁹⁷
- Mangrove restoration, to plant or not to plant⁹⁸
- Mangrove Restoration - Costs and Benefits of Successful Ecological Restoration⁹⁹
- The Mangrove Action Project (MAP)¹⁰⁰

⁹¹ <https://www.wetlands.org/>

⁹² <https://www.iucn.org/regions/asia/our-work/regional-projects/mangroves-future-mff>

⁹³ http://www.iucn.org/about/union/commissions/cem/cem_work/cem_restoration/

⁹⁴ <https://www.ser.org/>

⁹⁵ <http://czm-soctrang.org.vn/en/Home.aspx>

⁹⁶ <https://mangroveactionproject.org/>

⁹⁷ <https://www.environmental-expert.com/articles/best-practice-guidelines-on-restoration-of-mangroves-in-tsunami-affected-areas-573557>

⁹⁸ <https://www.wetlands.org/publications/mangrove-restoration-to-plant-or-not-to-plant/>

⁹⁹ <http://www.fao.org/forestry/10560-0fe87b898806287615fceb95a76f613cf.pdf>

¹⁰⁰ <https://mangroveactionproject.org/>

Appendix IV: Outline for a participatory Social Impact Assessment

Participatory Social Impact Assessment includes the processes of analyzing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment (IAIA, 1999).

A p-SIA can be undertaken in different contexts and for different purposes. The way a p-SIA is performed on behalf of a large multinational corporation as part of that company's planning and development may be very different than a p-SIA undertaken by a consultant to comply with regulatory agency requirements, or a p-SIA undertaken by a development agency interested in ensuring that their project has no unintended negative consequences. These, in turn, may be very different to a p-SIA undertaken by staff or students at a local NGO or university on behalf of the local community or a p-SIA undertaken by the local community itself.

Improving the social well-being of the wider community should be explicitly recognized as an objective of the farm and, as such, should be an indicator considered by any form of assessment. An absolute minimum benchmark is to avoid any harm and to be transparent about risks that may affect the well-being of people living around or between aquaculture farms. Impacts may vary among groups in society and the burden experienced by vulnerable groups in the community should always be of primary concern.

A p-SIA will be to ensure that:

1. the views of all stakeholder groups are considered;
2. there has been adequate negotiation about the outcomes (for each stakeholder group) of the intended activity or changes in ongoing activity,
3. the potential adverse consequences have been considered and classified according to the likelihood (risk) and severity (size, effect) of impact; and
4. the activity has been designed to reduce these consequences wherever possible and mitigate or compensate when reduction is not possible.

If done correctly, the effect of a p-SIA will be mutually beneficial:

- Maximized positive and minimized negative impacts on the wellbeing and livelihoods of the surrounding community.
- Reduced costs and risks to the farm due to increased comfort and reduced conflict with the surrounding community.

All properly implemented p-SIAs are sequentially repetitive (i.e., fine-tuned and adapted in a sequence of steps) and participatory (i.e., stakeholders are given the opportunity to influence process and contents of discussions). Specific methods need to be developed in the context in which they are to be applied, and they need to be addressed to a specific audience. Therefore, methods need to be developed in conjunction with relevant stakeholders. They need to become accepted as the guidelines of that group rather than being imposed.

Basic p-SIA methodology in seven steps:

1. The Stakeholder Analysis. Look for stakeholders (possibly affected people, groups, communities) and develop a two-way communication.

The Stakeholder Analysis is the entry point to SIA and participatory work, as it addresses the most important questions (e.g., who are the key stakeholders? What are their positive and/or negative interests in the project? What are the power differentials between them? What relative influence do they have on the operation?).

An easy way to identify stakeholders is to:

1. Draw a map of the key components of the (planned or existing) farm, both on and off site, that may give rise to local social impacts e.g., farm site, ancillary infrastructure (roads, power lines, canals), sources of water, air, feed, pollution, etc., introduced or intended restrictions to land or water use and mobility (e.g., fences, obstructions), and observed or suspected degradation in quality and quantity of natural resources around the farm and/or its ancillary infrastructure.
2. Identify the geographical areas in which such impacts take place or may take place.
3. Find out who lives in or makes use of these areas or has legal or customary entitlements in these areas.
4. Identify appropriate representatives of these people. Consider that women and children often have specific needs and interests.
5. Disseminate locally (in locally appropriate manner and language) the intention to undertake a p-SIA with the purpose of documenting actual or potential social impacts and the intention to consult stakeholders on ways to avoid, mitigate or compensate for these impacts.

Stakeholder groups include:

- Primary stakeholders: those directly affected, either positively or negatively, by a farm development or operation.
- Secondary stakeholders: those who are indirectly affected by a farm development or operation.
- Key stakeholders: (who can also belong to the first two groups) those who have significant influence upon or importance within or to the farm development operation.
- Non-key stakeholders: (who can also belong to the first two groups) those who are directly or indirectly affected and without significant influence or importance to the farm development or operation.

2. Description of farm and effects. Make a description of the current or intended farm and at least two alternatives (one of which is the “no farm” scenario). Focus on siting, size (including ancillary structures and buffer-zones), habitat (conversion), inflows of natural resources (e.g., water and groundwater), interruption of natural processes (e.g., fisheries, tidal moves, surface streams, canals, dykes), interruption of social or socio-economic processes (e.g., walkways, paths, access to land and water, ancestral/cultural significance), and wastes coming from the farm (e.g., water, effluent, pollution, noise, light). Processes on the farm need only be described if risks outside the farm are associated (e.g., pesticides and antibiotics may drift, organic substances may have unintended consequences outside of a farm). Process descriptions need not include operational details that are not relevant to an external risk/impact discussion. For existing farms, past impacts are excluded from the process.

3. Initial listing of probable social impacts. Describe or make an estimate of changes and how they will affect each identified stakeholder or group.

Social impacts may be conceptualised in one or more of the following impact areas:

- *economic aspects* (influence on employment, or livelihoods in the village)
- *natural resource access and use* (land and water tenure, influence on quality and availability of natural resources)
- *human assets* (food security, health and safety, education, indigenous knowledge)
- *physical infrastructure* (access to roads, electricity, telephone, housing, waste disposal systems)

- *social and cultural aspects* (indigenous/local rights and beliefs, social exclusion/inclusion, gender equity, changes in age composition of the community, local informal institutions and organizations)
- *governance aspects* (influence of aquaculture on norms, taboos, regulations, laws, conflict management and whether these changes result in greater or less transparency, accountability and participation in decision making)

It is also important to consider that, in all areas, both positive and negative impacts can occur, or could have already occurred. Results and outcomes can be organised in the form of a table with an impact-matrix with impact-areas and groups of stakeholders at the axes of the table. At this stage of a p-SIA, qualitative or even “alleged or suspected” positive and negative impacts may suffice. When the importance of these is questioned (by farm owner or by stakeholders), deeper research can be undertaken in step 4.

4. Deeper research on important impacts. Perform or commission research on probable impacts that are likely to be most important (e.g., likelihood, scale, effect). Arrange a meeting, or meetings, with stakeholders or stakeholder representatives to let them prioritise and express how they feel/see/assess/perceive risks and impacts. Seek to identify both positive and negative impacts, as this paves the way for handling trade-offs.

5. Propose adaptations. Propose an adapted farm set-up or adapted farm operations with clarification on how impacts and risks are changed. Make recommendations to maximize the positive impacts and minimize the negative impacts. Consider avoidance, mitigation, and compensation as possible measures.

6. Agree on impacts and measures to address them. Develop and approve with all stakeholders (groups, representatives) a description of remaining impacts, the mitigation or compensation of those impacts and a monitoring plan.

7. Summarize conclusions and agreements. A summary with main outcomes is translated in the local language(s).

Applying a p-SIA on existing and new farms

It does not matter whether a p-SIA is done for an existing farm, an expanding farm, or a new farm. The methodology and the recognition of issues (positive and negative) remain the same.

For new farms, the focus of this criterion lies in assessing future risks and impacts. This will be done before construction of the farm begins. For existing farms, the focus lies in assessing actual (previous and current) risks and impacts. In both cases, the outcome is oriented towards identifying how to responsibly address these risks and impacts in negotiated processes with those who are affected. Avoiding unwanted impacts may be more difficult on existing farms, whereas

negative impacts and the need to compensate affected stakeholders may be lessened when plans for a future operation can still be adjusted.

Applying a p-SIA relative to scale or size of the farm

The following guidelines describe the different methodologies and levels of support that may be required to conduct a p-SIA based on the size of the farm (particularly steps 1, 3, and 6).

Large farms (16 ponds or 25 hectares and above) will need professional expertise to undertake a p-SIA, due to the size of the area and operations, the size of stakeholder groups and the potential for indirect effects (e.g., displacements, social changes in the community, health and income effects among parents and the repercussions these may have for survival and the education of children). Hiring a small team (a senior coordinator and junior researcher(s) with relevant academic expertise) will be required. Engagement with stakeholders will most likely be structured through sampling and meetings with representatives.

A Beneficiary Assessment (BA) is a systematic investigation of the perceptions of a sample of beneficiaries and other stakeholders to ensure that their concerns are heard and incorporated into project and policy formulation. The purposes are to (a) undertake systematic listening, which “gives a voice” to poor and other hard-to-reach beneficiaries, highlight constraints to beneficiary participation, and (b) obtain feedback on interventions.

Medium-scale farms (six to 15 ponds but no larger than 25 hectares total production area, or with two or more hired workers) may be able to do a credible p-SIA through the consultancy services of an academic or civil society organization in, or who is familiar with the area and its people. One person may be able to plan, implement and report on a p-SIA. A useful way to engage stakeholders is through organizing participatory rural appraisal (PRA) sessions wherein the classification of stakeholder interests must remain clear, but the distinction between “representatives” and “those represented” need not be precisely known.

Participatory Rural Appraisal (PRA) covers a family of participatory approaches and methods that emphasizes local knowledge and action. It uses group animation and exercises to facilitate stakeholders sharing information and making their own appraisals and plans. Originally developed for use in rural areas, PRA has been employed successfully in a variety of settings to enable local people to work together to plan community-appropriate developments.

Focus group meetings are a rapid way to collect comparative data from a variety of stakeholders. They are brief meetings, usually one to two hours, with many potential uses (e.g., to address a particular concern, to build community consensus about implementation plans, to cross-check information with a large number of people, or to obtain reactions to hypothetical or intended actions).

Small farms (local decision-making authority over farm, a maximum of one permanent hired worker and a maximum of five ponds and with a total area of no larger than five hectares) can undertake a credible p-SIA through expertise available within the local community, such as a local schoolteacher or leader with social standing. The ability to read and write, the authority to convene and chair a meeting and the social reputation of impartiality and integrity are all necessary basic skills. The impacts of small farms are likely to be small geographically, and stakeholders are likely familiar with each other.

Village meetings allow local people to describe problems and outline their priorities and aspirations. They can be used to initiate collaborative planning and to periodically share and verify information gathered from small groups or individuals by other means.

In group certification situations (cooperatives or a geo-physically defined area of individual farms of which products are moved to the same trader or processor), the whole group is considered the unit of interest.

For cooperatives or groups of farms in the same area, the total number of ponds or total area covered by the cooperative/group determines what structure and resources a p-SIA will take. The group or cooperative needs to be bound legally and verified by a registration of membership or a documented commitment to work together under a common set of rules or contract and must share a geographic location or a geophysical resource (such as the water system).

Cooperatives or clusters of small farms are considered as one “small farm” in the context of a p-SIA if the group engages in group certification together, is not bigger than 25 member farms and with at least 75% of the total production capacity of the cooperative/cluster coming from small-scale farms.

Cooperatives or clusters of more than 25 small farms and cooperatives or clusters of small-scale and medium-scale farms with more than 25% of the production coming from medium-scale farms, are considered as a “medium-scale farm” in the context of a p-SIA if the group engages in group certification together.

All cooperatives or clusters that include a large farm will be considered as a large-scale entity in group certification regarding the p-SIA.

All other groups, cooperatives or clusters can, in group certification and regarding the p-SIA, only be considered as a large-scale entity.

In summary, the full overview of p-SIA methodology is adapted to the scale of the farm or group of farms as follows in the table below:

Farm scale	p-SIA methodology
<p>Single small-scale farms or cluster/cooperative of no more than 25 member farms with at least 75% of the total production capacity of the cooperative/cluster coming from small-scale farms and applying for group certification.</p> <p>A small-scale farm is defined as the local decision-making authority, has a maximum of one full-time permanent hired worker, and a maximum of five ponds but a total production area of no larger than five hectares.</p>	<p>p-SIA through expertise available within the local community.</p>
<p>Single medium-scale farms or cluster/cooperative of more than 25 small-scale farms or with more than 25% of the total production capacity of the cooperative/cluster coming from medium-scale farms and applying for group certification.</p> <p>A medium-scale farm is defined as having six to 15 ponds but a total production area of no larger than 25 hectares, or two full-time, permanent employees or more.</p>	<p>Academic/NGO consultant and PRA methodology in p-SIA.</p>
<p>Single large-scale farms or cluster/cooperative including any large-scale farm applying for group certification.</p> <p>A large-scale farm is defined as having more than 15 ponds, or more than 25 hectares of total production area.</p>	<p>Need professional expertise and BA methodology to undertake a p-SIA.</p>

Note: “decision-making authority is local” means residing in an area within daily commuting distance. Decision-making authority (often determined by ownership) refers to the actual mandate to make decisions on concerns and expectations of interested third parties. Authority needs to include the mandate to undertake and implement agreements of a p-SIA on matters such as land acquisition, operational

matters involving water use and management, pond design, security arrangements (e.g., fences, guards), conflict resolution, information, communication, allowing/endorsing adequate community representation, negotiation, and reaching binding agreements.

Note: The production area is the total area used by the farm, including storage buildings, sheds, worker accommodation, offices, etc. on the farm. Where farms are fenced or have put up barriers to access, the restricted area is considered the production area.

Auditing on a p-SIA

When auditing for this criterion, auditors need to look for the completeness of a p-SIA report and verify the way the farm owner/operator took active responsibility in finding out about impacts, discussing these openly with stakeholders and seeking to come to mutually agreeable terms in resolving concerns. Auditors need to verify documentation is appropriate and disseminated (is it informative, does it cover the steps outlined above, is it available in the local government and the community, are meeting dates and participants listed). Auditors must cross-check with participants to find out if the required information is indeed available to them (do they have a copy, did they proofread a draft for comments, were comments they made reflected in the final draft?) and if they agree with the outcomes/conclusions the documentation is listing (are listed issues and negotiation points indeed the issues and negotiation points agreed to by all parties?).

For compliance with this criterion, auditors need not verify the accuracy, robustness or quality of the data-gathering in a p-SIA report. Auditors do not need to assess whether impacts are present or absent, as the p-SIA report will already have done that.

Checklist for farmers and guideline for auditors on a complete p-SIA process and report

	Done	Still to do
1. Quality of the p-SIA process (e.g., is it participatory and transparent).		
(a) The intent to conduct a p-SIA is locally		

publicly communicated with sufficient time for interested parties to participate and/or get informed.		
(b) Documented meetings with stakeholders (or their representatives) have taken place throughout the listing, impact description and final p-SIA preparation process		
(c) These meetings have been minuted and records are attached to the final report; names and contact details of participating stakeholders are included.		
(d) Evidence is provided that draft and final p-SIA reports have been submitted to a local government representative and, if stakeholders so desire, to a legally registered civil organization (chosen by stakeholders). -		
(e) B-EIA completed according to guidance under 2.1 (appropriate accreditation and consultation).		
2. The risks and actual (past and present) impacts of the current or intended farm and at least two alternatives (one of these is the “no farm or no expansion” scenario). Concepts to cover include:		
(a) Economic aspects (influence on employment opportunities, influence on other livelihoods in community).		
(b) Natural resource access and use (land and		

water tenure, influence on quality and availability of natural resources including water).		
(c) Human assets (food security, health and safety, education, indigenous knowledge).		
(d) Physical infrastructure (access to roads, electricity, telephone, housing, waste disposal systems).		
(e) Social and cultural aspects (indigenous/traditional/customary rights and beliefs, social exclusion/inclusion, gender equity, changes in age composition of the community, local informal institutions, and organizations).		
(f) Governance aspects (influence of aquaculture on norms, taboos, regulations, laws, conflict management and whether these changes add up to more or less transparency, accountability, and participation in decision making).		
3. Research and report the most important probable impacts. In doing this, it is important to arrange meetings with stakeholders to let them prioritize and to let them express how they assess/view/feel; identify both positive and negative risks and impacts.		
4. Do deeper investigations into priority impacts with a focus on the question: "What changes will result if these impacts occur?" These include:		

(a) Physical effects to man-made and natural structures and processes.		
(b) Likely adaptations and the social and economic effects of making such adaptations.		
(c) How these effects and indirect effects would compare to having no intervention.		
(d) How effects may or might be cumulative.		
5. Make recommendations to maximize the positive and minimize the negative, with consideration to compensation options for those lands and people impacted. Also include recommendations on how to avoid these issues with the intended farm or farm development.		
6. Propose a mitigation plan assuming the farm development will take place or continue (in an adapted form if appropriate); include a “closure and reclamation plan” explaining how repair or restoration will take place after farm closure or bankruptcy (see P2).		
7. Develop and approve with all stakeholders a monitoring plan and indicators on both positive and negative risks and impacts (make use of FDG and/or PRA methodologies in this step).		
8. A summary with recommendations and conclusions is made available to all involved in the process and,		

through local public notices, to all members of the local community.		
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Further reading:

- Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets.¹⁰¹
- *A Comprehensive Guide for Social Impact Assessment.*¹⁰²
- *Breaking Ground: Engaging Communities in Extractive and Infrastructure Projects.*¹⁰³
- *Development without Conflict: The Business Case for Community.*¹⁰⁴
- *Guide to Free Prior and Informed Consent.*¹⁰⁵

¹⁰¹https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_handbook_stakeholderengagement_wci_1319577185063

¹⁰²<https://phdessay.com/a-comprehensive-guide-to-social-impact-assessment/>

¹⁰³ https://pdf.wri.org/breaking_ground_engaging_communities.pdf

¹⁰⁴ https://pdf.wri.org/development_without_conflict_fpic.pdf

¹⁰⁵ http://www.culturalsurvival.org/sites/default/files/guidetofreepriorinformedconsent_0.pdf

Appendix V: Contract farming arrangements

This guidance to P for indicator 3.4 consists of two parts.

Part A lists information that should be available in the contract documents, to ensure that both parties have written specifications as to what is agreed to and signed. Auditors will be able to check the completeness of a contract by reading the document.

Part B is guidance on how to engage in a contract farming arrangement in a fair and transparent manner. It consists of advice on how the larger party (presumably a company) can pro-actively ensure that the smaller party (presumably the farmer or farmer cooperative) understands and feels comfortable with the agreement.

Part A: Recommendations for fair contract farming processes

Farmers and/or their representatives should best be given the opportunity to contribute to the drafting of the contract agreement and assisting in the specifications in terms farmers can understand. Farmer-management forums, which link company management and farmers or their representatives for purposes of interaction and negotiation, can mitigate many potential problems resulting from a lack of communication.

Any contract, however brief or informal, should represent a real and mutual understanding between the contracting parties. The contracting party must try to ensure that agreements are fully understood by all farmers. In many countries, a high proportion of farmers may be illiterate and, therefore, it may be necessary to rely on oral rather than written contracts. However, the terms and conditions entered must be written down for independent examination and copies given to all farmers (regardless of their literacy level). Copies should also be available to relevant farmer representatives and relevant government agencies.

The technical aspects of the agreement are best drafted in short, simple terms, clarifying the responsibilities of both the contracting company and the contracted farmer. Pricing formulas in the financial section are best designed to encourage farmers to produce maximum yields at optimal quality, while specific clauses need to be included to control the possibility of extra-contractual marketing, either forbidding it or (partially) allowing it. It is recommended to allow a degree of side-selling or, at least, to avoid a contract arrangement on the full volume a contracted farmer can be expected to produce.

Quality specifications may outline the size and weight of the product, the degree of maturity and the way it is packaged and presented. The number of quality

grades should be kept to a minimum, and each grade's specifications should be presented in clear terms.

It is acceptable to define and determine in contract farming arrangements the technical specifications under which, the product is to be produced. However, it is then best to ensure that the farmer understands these specifications and the reasons for them, and to verify whether compliance is feasible from the farmer's perspective.

Part B: Mutually transparent contract design in contract farming arrangements: a guide to contract format and contents

Contracts in contract farming arrangements should (adapted from FAO & ISSD 2018 and Strom & Hoeffler, 2006):

- Be written in a language understandable to the contracted party.
- Be written to be enforceable in a court of law of the country in which the contracted party operates.
- Define the parties by legal identity, signatory name and address and contact details. Signatures should be clearly visible on copies held by both parties.
- Define a starting date and an ending date.
- Identity the location of the farm the product is expected from, including the total production area size covered under the contract.
- Specify the product in both quality and quantity terms. Quality definitions should be written in terms that are open to verification by both parties. If the contract includes quota (either a minimum or a maximum), the contract should also establish the consequences of not meeting minima quota or exceeding maxima quota.
- State the time and manner of delivery of the product.
- Establish prices, or price calculation formulas (including price adjustments related to variations in quality, quantity or time of delivery), payment obligations and terms of payment.
- State, if credits and/or inputs are provided by the contracting party to the contracted party, the terms under which these are delivered and priced or valued should be clearly defined and not be above interest rates prevailing on the open market.
- Indicate mutual obligations of both parties and spell out sanctions or consequences of not upholding those.

- Define arrangements covering insurance or mention any absence of these.
- Indicate the consequences of failure to uphold commitments made in the contract, such as non-delivery of product, non-payment for received product, “acts of God” (on the side of the contracted party), or bankruptcy (on the side of the contracting party).
- Refer to a dispute settlement mechanism or to an arbitrator to resolve disputes accessible to the contracted party. This can be a government agency, authority, or civil society organization without a direct stake in the outcome of the contracted agreement.
- Define termination arrangements, review procedures, (intermediate) monitoring arrangements and under what circumstances and conditions a contract is transferable.

In the instance that intermediate changes to a contract are necessary, these will be communicated on paper and come with the right of either party to terminate the contract.

Appendix VI: Survival rate (SR) calculation

A suitable and reliable PL counting system is important so that the SR measure is meaningful.

Individual pond survival rates $\geq 95\%$ are assumed to result from underestimation of PL number and, consequently, cannot be included in the calculation of the annual average survival (Step 2 below). ASC is considering developing guidance to allow for lower survival due to 'unexpected events' as long as a measure of accountability can be demonstrated.

Step 1 - Individual Pond Survival Rate Calculation

The estimated number of crustacea harvested is calculated by dividing the harvested biomass by the harvest average body weight and SR can be estimated for each pond using the following formula:

$$\% \text{ Pond SR} = \frac{(\text{harvested biomass})/(\text{average body weight})}{\text{stocked PL count}} \times 100$$

Note: Farmers are responsible for all counts, including the stocked PL count and hatchery counts. The stocked PL count needs to be taken when PLs are transferred from the hatchery to the farm, whether they are stocked directly in grow-out ponds or in some intermediate, nursery raceway or pond.

Step 2 – Annual Average Survival Rate for the Farm

The annual average SR is the weighted average value for all ponds harvested during the last 12 months and is calculated as follows:

$$SR = \left(\frac{\text{Number of shrimp harvested in all ponds in the last 12 months}}{\text{Number of PL stocked in all ponds in the last 12 months}} \right) \times 100\%$$

Appendix VII: FishSource scoring

FishSource scores provide a rough guide to how a fishery compares with existing definitions and measures of sustainability. The FishSource scores currently cover five sustainability criteria, whereas a full assessment, such as that by the MSC, will typically cover more than 60. As such, the FishSource scores provide only a rough guide as to how a fishery will perform overall. Nonetheless, the FishSource scores do capture the main outcome-based measures of sustainability.

FishSource scores are based on common measures of sustainability, as used by the ICES, the National Marine Fisheries Service and the MSC, among others (e.g., current fishing mortality relative to the fishing mortality target reference point or current adult fish biomass relative to B_{msy}).

Issue	Measure	Underlying ratio
Is the management strategy precautionary?	Determine whether harvest rates are reduced at low stock levels.	$F_{\text{advised}}/F_{\text{target}}$ reference point or $F_{\text{actual}}/F_{\text{target}}$ reference point
Do managers follow scientific advice?	Determine whether the catch limits set by managers are in line with the advice in the stock assessment.	Set TAC/Advised TAC
Do fishers comply?	Determine whether the actual catches are in line with the catch limits set by managers.	Actual Catch/Set TAC
Is the fish stock healthy?	Determine if current biomass is at long-term target levels.	SSB/B ₄₀ (or equivalent)
Will the fish stock be healthy in future?	Determine if current fishing mortality is at the long-term target level.	F/F_{target} reference point

If existing measures of sustainability consider a fishery to be relatively well-managed, receive a FishSource score of 8 or more out of 10. If the fishery is judged to be require some improvement, it will typically score between 6 and 8 on FishSource. A fishery falling short of minimum requirements of existing measures of sustainability scores 6 or below, with the score declining as the condition of the fishery deteriorates.

FishSource scores can be used as proxies for MSC scoring, with a FishSource score of 8 equal to a MSC score of 80. A FishSource score of 8 or above would mean an unconditioned pas for that aspect on the MSC system. Please note, however, that the MSC criteria have been interpreted through time with a substantial degree of variability among fisheries. More information on FishSource is available at www.fishsource.org.

About scoring and availability of product meeting a minimum score

A full assessment of a fishery by MSC will include significantly more areas/criteria assessed than through FishSource. A fishery is deemed sustainable by the MSC if it scores 60 or more in every performance indicator, and an average of 80 or more at the Principle level. The MSC requires certified fisheries to take corrective actions to improve any areas of the fishery scoring between 60 and 80, with the goal of achieving a score of 80 or above in every area of the fishery.

Appendix VIII: Feed resource calculations and methodologies

Forage Fish Dependency Ratio (FFDR) calculation

Forage fish dependency ratio is the quantity of wild fish used per quantity of cultured fish produced and is calculated for the grow-out period. This measure can be weighted for fishmeal or fish oil, whichever component creates a larger burden of wild fish in feed. Currently, in the case of crustacea, the fishmeal (FM) will be the determining factor in most cases. The dependency on wild forage fish resources must be calculated for FM. This formula calculates the dependency of a single site on wild forage fish resources, independent of any other farm.

Where:

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

$$FFDR_m = \frac{(\% \text{ fish meal in feed}) \times (eFCR)}{22.2}$$

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

The percentage of fishmeal and fish oil excludes fishmeal and fish oil derived from fisheries by-products or trimmings.¹⁰⁶ Only fishmeal and fish oil that are derived directly from a pelagic fishery (e.g., anchoveta) or fishery where the catch is directly reduced (such as krill) is to be included in the calculation of $FFDR_m$. Fishmeal and fish oil derived from fisheries by-products (e.g., trimmings and offal) should not be included because the $FFDR_m$ is intended to be a calculation of direct dependency on wild fisheries.

The amount of fishmeal in the diet is calculated back to live fish weight by using an assumed average yield of 22.2%.

¹⁰⁶ 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. Trimmings from species that are classified as critically endangered, endangered, or vulnerable in the IUCN Red List of Threatened Species are not allowed in feed (<https://www.iucnredlist.org/>).

Appendix IX: Calculations for nitrogen and phosphorus

7.5.1-7.5.2 Nitrogen and phosphorous load calculations

Annual nutrient loads are calculated for an entire farm (harvested ponds) over a period of 12 months to consider seasonal and between-pond variations, using one of the following formulas, depending on the type of farm:

Farms that operate earthen ponds at a daily water exchange rate of 10% or less may make a theoretical calculation:

N load kg/ton crustacea = N input in kg x 0.3 / tons of crustacea produced

P load kg/ton crustacea = P input in kg x 0.2 / tons of crustacea produced

Where:

N/P input = kg of N/P inputs from feeds and fertilisers

Feed N/P(kg) = (kg feed 1 × %N/P in feed1) + (kg feed 2 × %N/P in feed2) + ...+

Fertiliser N/P (kg) = (kg *fertiliser*₁ × %N/P *fert*₁) + (kg *fert*₂ × %N/P *fert*₂) + ...

Farms that do not meet the above criteria are required use the following calculation:

Note: all NP concentrations are reported in mg/L

NP load (kg per tonne of crustacea harvested)

$$= \frac{\left(NP \text{ effluent water } \left[\frac{mg}{L} \right] - NP \text{ supply water } \left[\frac{mg}{L} \right] \right) \times \text{effluent water } [m^3]}{\text{harvest volume } [t] \times 1000}$$

7.5.4 Specifications for settling basins

Settling basins must be constructed according to the following specifications:

- Hydraulic retention time (HRT) = nine hours (this will avoid the settling basin from having to be cleaned out frequently to maintain a minimum HRT of six hours.)
- Design of basin must include seepage and erosion reduction control features (e.g., proper soil texture, good compaction and grass cover);
- Water enters at surface of basin through a weir or pump;
- Water exits surface of basin through a weir on opposite side;
- If basin is square or nearly so, a baffle must be provided to avoid the short-circuiting of flow;
- A drain structure should be provided so that the basin can be emptied.

Posts must be placed at five places in the basin. These posts will extend to the height of the full basin water level. They will be used to estimate average depth of sediment accumulation. Sediment depth cannot exceed one-fourth (25%) of the original basin depth, as measured by the distance from the top of the post to the sediment surface.

Appendix X: Water quality sampling methodology and data sharing

Requirement 7.5.5 requires land-based farms measure dissolved oxygen in their effluent. Farms must submit to ASC the results from the water quality monitoring under requirement 7.5.6. This data will help to determine performance levels of certified farms over time and assist in revisions to the requirement.

Oxygen saturation must be measured at least monthly in the early morning and late afternoon. A single oxygen reading below 65% necessitates daily continuous monitoring with an electronic probe and recorder for at least a week demonstrating a minimum 65% saturation at all times.

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

Farms should utilise the table provided in Appendix X and submit data via excel file to data@asc-aqua.org.

Data should be reported per site and data submissions should be named according to the instructions in the ASC [Farm Data Submission Checklist](#) provided online: <https://asc-aqua.org/producers/get-certified/>

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

Appendix XI: Fisheries Improvers Program (FIP)

Applicants for adoption onto the improver program (IP) must include a named factory producing fishmeal and fish oil and at least one associated fishery.

For acceptance into the IP, a factory must produce a gap analysis and an action plan.

The factory is responsible for the implementation of the Action Plan on agreed timelines.

1. **Gap Analysis** identifies the status of one or more raw material sources of marine products against the MSC standard
2. **An Action Plan** identifies how, when and by whom shortcomings will be addressed.

Phase 1 – Initial Assessment (Gap analysis)

The applicant shall ask their source fishery/fisheries to formally contract a consulting party (either an accredited CAB or assessors who have participated in at least 3 full MSC scoring teams by an accredited CAB and completed MSC's online training) to undertake an MSC pre-assessment (gap analysis).

If the fishery has already applied but failed to achieve the MSC standard, the existing audit report can be used to determine the required improvements. Fisheries with limited resources may use scores from other improvement projects that have been assessed for the same stock for Principle 1, provided the fisheries do not have material differences (e.g., use of different reference points in different jurisdictions).

The gap analysis shall identify any deficiencies and required improvement by the fishery/ies.

Phase 2 – Creating and Executing an Action Plan

If necessary, improvements are identified during the gap analysis, a Stakeholder Committee shall be formed. The Stakeholder Committee shall have the task of drafting an Action Plan.

The composition of any Stakeholder Committee is flexible but must have public and private sector representation and may have representation from:

- The applicant fishery
- Interested buyers

- Relevant (or partnering) eNGOs
- Any associated local fishing industry members
- Relevant fisheries management agencies (both administrative and scientific)
- Science advisors
- FAO or similar agency (could be a regional body for example)
- Funding agencies
- Local environmental groups

The Stakeholder Committee shall draft an Action Plan with 1) activities, 2) time-bound milestones, 3) costs and 4) funding source(s). The applicant fishery, associated factory, one public and one private Stakeholder Committee representative shall all agree in writing that the plan is achievable.

The duration of the Action Plan will be dependent on the complexity of the work required. To be eligible, all participating fisheries must commit to entering full MSC assessment.

The consulting party shall issue a formal notification via the ASC website that the fishery and any associated fish meal or fish oil producers sourcing from this fishery, with an MSC/ASC CoC certificate and producing a **segregated** line of fish meal or fish oil, has a formally entered the IP. At this point both the fishery and factory may refer publicly to their status. However, it should be noted that no certification to the factory has been given at this stage.

A consulting party shall ensure that the milestones in the Action Plan are being adhered to annually, and reports on progress are to be posted publicly.

Serious failure (> 1 year inability to meet a timeline) to adhere to milestones in the Action Plan shall result in the removal of the factory from the IP. In the event of dispute, the ASC TAG shall act as an appeal body.

Phase 3 – Certification of the fishery to MSC

Upon completion of the Action Plan, the fishery or the factory on behalf of the fishery, must apply for MSC full assessment. An MSC accredited Certification Body shall audit the fishery against the MSC standard.

ASC shall publish on its website a list of all fisheries and mills that are active in the Feed Fisheries Improvers Program with dates of the expected completion of their Action Plans and the dates that all fisheries intend to enter full MSC certification.

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