DRAFT STANDARDS FOR
RESPONSIBLE SHRIMP AQUACULTURE

Created by the Shrimp Aquaculture Dialogue

December 2011

Version 3.0 for Guidance Development and Field Testing

Note: This document does not reflect final agreement by the Shrimp Aquaculture Dialogue Global Steering Committee. Steering Committee members retain the right to modify the text of the standards' guidance pending the results of field testing.

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Introduction

Seafood is one of the most popular sources of protein worldwide. By volume, more than half of the seafood we eat is farmed, while the other half comes from the wild. Aquaculture's contribution is expected to continue to rise while the wild-caught supply is expected to diminish or remain stable, as fisheries have reached their maximum production limits.

As with any rapidly growing activity, there are global concerns regarding aquaculture production. Specifically, the possible impacts commonly associated with aquaculture, such as water pollution, the enhancement and spread of disease, escapes outcompeting native species, habitat degradation, and social impacts to surrounding communities.

Within the aquaculture industry, some operators are better than others at mitigating these negative environmental and social impacts. It is important that we face the challenge of identifying the key areas where production can be improved. These changes could reduce or, ultimately, eliminate negative impacts. For such undertaking to be successful it is important to develop market mechanisms to reward and to help finance the improvements.

One solution is the creation of a set of standards for responsible aquaculture products that reward best practices. Certification standards for social and environmental responsibility, when they are adopted and compliance is appropriately verified, can help reassure retailers and consumers that the impacts related to aquaculture are minimized and mitigated to acceptable levels.[1] Standards can also provide aquaculture industry stakeholders with the tools to demonstrate to consumers and major buyers the real cost of production, which could help to ensure that farmers are appropriately compensated for their products.

Objective of the ShAD Standards

The Shrimp Aquaculture Dialogue (ShAD) has developed a performance-based set of standards that define the acceptable levels for the major social and environmental impacts[2] of shrimp farming.[3] The ShAD Global Steering Committee (GSC) has attempted to create a series of performance thresholds that can currently be met by the top performers of producers, in an attempt to reward those producing to the specified target levels and creating an incentive for other players to improve performance. The GSC believes that this represents a sufficient proportion of producers and ensures that only those who are actively achieving the target levels are rewarded.

The GSC recognizes that every action that has an impact on natural resources could be perceived as limiting the resilience of those resources. Conversely, many human actions could be perceived as necessary for survival. The ShAD Standards attempt to reduce the ambiguity between these extremes and to clarify what is an acceptable level of impact based on the best performance (e.g., the top 20%).

The ShAD Standards strive to set performance standards at the farm level that are ambitious, yet practical for approximately the top 20% of farms to achieve, whether those farms are large or small. At the same time, the standards are intended to help protect and maintain large-scale ecosystem function and ecosystem services in shrimp-producing areas, with the recognition that aquaculture operations are

[1] As determined by the stakeholders who created the standards.

[2] Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services. Environment is defined as surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation (ISO).

[3] A numerical result is not necessary when an indicator cannot be quantified. For example, the indicator for the principle "Obey the law," is "Documentation of compliance with national and local regulations." Thus, evidence of the necessary documentation satisfies the requirement.

not solely responsible for total ecosystem health. Quantitative performance levels were set wherever possible in an attempt to minimize the amount of auditor judgment necessary to assess compliance. This includes the manner in which they act responsibly as an advocate and steward of the social and ecological environment in which they operate.

The final standards are different from Better Management Practices in that they define acceptable impacts rather than prescribe a specific production method. The core philosophy, in practice, is that farmers as the production experts should be given the freedom to innovate around a collectively defined environmental or social benchmark.

Standards Structure
Each standard tries to address a potential specific impact. Each potential impact is addressed by means of a principle, multiple criteria and indicators, as defined below:

Impact: The potential problem to be addressed
Principle: The high-level goal for addressing the impact
Criteria: The area on which to focus to address the impact
Indicator: What to measure to determine the extent of the impact
Standard: The specific metric to ensure sufficient mitigation of the negative impact

Participation and Process Origins
Created in 2007 by World Wildlife Fund (WWF), ShAD meetings have been attended by more than 400 people from a diverse spectrum of stakeholder sectors, including: shrimp producers, environmental and social non-governmental organizations (NGOs), development organizations, retailers, wholesalers, aquaculture associations, academics, researchers, government representatives and independent consultants.

The ShAD's 14-person GSC is a voluntary group responsible for managing the ShAD Standards process, drafting and finalizing standards based on public input, their own expertise and the expertise of outside experts as needed. The GSC was formed in February 2009, and began using the input received at the regional dialogue meetings to develop global standards. The process sought to have balanced representation on the GSC from mainly NGOs and industry members; however, the process only worked with those individuals who were willing to volunteer their time and commit to the goals of the process.[4]This group includes shrimp aquaculture producers, representatives from environmental and social NGOs, and academics and certifiers who sought to represent constituent groups larger than themselves. GSC members were committed to the aim of developing a diverse and balanced decision-making body to the extent it could, given those who were interested in volunteering their time to participate. In the end, the process did not achieve a perfect balance of stakeholders (i.e., an equal participation of NGO and industry), but there was sufficient representation to allow the process to move forward.

The basics of the ShAD Standards process[5] and the third public version of the ShAD Standards are presented in this document, along with the underlying rationales for why a particular standard was developed, how it is intended to address the identified impact and what (if any) are the plans for the continuous improvement of the standards. This document also provides initial guidance on how to

[4] See the ShAD process document for more information on the GSC and the history of the ShAD
[5] See the ShAD process document for more information on the GSC and the history of the ShAD

demonstrate compliance and audit against the standards. [6]

The completed standards will be managed by the Aquaculture Stewardship Council (ASC). Auditor checklists and guidance documents will be developed immediately following the release of this document and will better explain the methodologies used to determine if the standards are being met. A Better Management Practices (BMP) manual geared towards showing producers options for meeting the performance targets will also be developed as soon as possible. The BMP manual will be particularly useful to those producers who do not have the capability to test new and innovative techniques that could be used to meet or exceed the standards. Particular attention will be given to the challenge of small holders in this document.

For complete information about the Shrimp Aquaculture Dialogue process, including meeting summaries and presentations, go to www.worldwildlife.org/shrimpdialogue. For information about the ASC, go www.ascworldwide.org.

Understanding standard setting, certification and accreditation

Recognizing the link between certification and the component of a certification scheme, standards holding, standard setting and accreditation is important for understanding the ShAD Standards process. Aquaculture certification schemes must be consistent with rigorous procedures for standard setting, accreditation and certification to ensure that certification schemes are credible.

Standard setting

It is essential that the process is not dominated by one or a few stakeholder groups. The standards will be more credible and effective if they are based on the expertise and experiences of a broad and diverse group of people who are interested in and/or affected by aquaculture (e.g., producers who use different management practices, conservationists from international and local organizations, and scientists who specialize in different fields related to aquaculture or its impacts). The process for the Shrimp Aquaculture Dialogue encompassed stakeholder meetings, meetings of the GSC and consultation/comment from diverse stakeholders. The ShAD followed the International Social and Environmental Accreditation and Labeling (ISEAL) Alliance's "Code of Good Practice for Setting Social and Environmental Standards[7]" when creating this standard.

Standards holding

The responsibility for the holding of standards and the policies necessary to functionalize the scheme rest with the ASC.

Certification

Certification is the validation that standards have been achieved by producers. Certification may also refer to the labeling of companies, practices, operations or products that conform to the standards. Certification schemes encompass the processes, systems, procedures and activities related to three primary functions: standard setting, accreditation and certification (i.e., verification of compliance, also known as "conformity assessment"). The organization that generates revenue from the labeling of products and distribution of certificates must not have any connections with the standard-setting body (i.e., it must be firewalled), as this could create an incentive to increase revenues by weakening

[6] The ShAD recognizes that there may be challenges with auditing some of these standards. However, it is expected that stakeholders will work to further develop auditing guidelines that will better ensure that the social and environmental impacts are mitigated in a practical and efficient way. The ShAD welcomes comments on auditing guidance particularly for challenging standards.

[7] www.isealalliance.org

standards. For the same reasons, the auditors determining compliance of a farm must not have a conflict of interest with the standards development body, the certifier or with the farms being audited. Auditors need to be accredited to assure that audits are conducted consistently and robustly amongst different auditors. This is an important element of the governance structure, as there would otherwise be an incentive for auditors to audit poorly or interpret the standards loosely. For these reasons, third-party certification is the most robust and credible process.

Accreditation Accreditation is the process of authorizing entities to verify compliance with the standards. It is important that there is no conflict of interest between the entities that participated in the standard-setting process (in this case, the ShAD GSC), the entity that manages the standards (the standards holder, ASC), the entity that accredits third-party certification bodies (Accreditation Services International) and the entity that undertakes the third-party certification (various ASI-accredited certification bodies). Firewalls are required between these various entities to assure that independence and credibility are maintained.

Scope of the Shrimp Aquaculture Dialogue standards

The ShAD Standards cover the most significant environmental and social impacts of shrimp aquaculture, which primarily originate from the production systems themselves and the immediate inputs to production, such as feed, seed, chemicals and water, and social impacts related to on-farm labor and community relations. The ShAD Standards built on a significant consultative process initiated by FAO that was completed in 2006[8].

The ShAD Standards apply to the planning, development and operation of shrimp farming (grow-out) systems.
Planning: addresses farm siting, resource use or extraction, and assessment of environmental, social and potential cumulative impacts.
Development: addresses construction, habitat alteration and access to public areas by other resource users.
Operation: addresses effluent discharge, working conditions, continued monitoring towards avoiding or minimizing risks to people and the environment, stock management, predator control, biosecurity, use of medicines and other chemicals, and feed sources and use and closure of the farm.

Geographic scope to which the standards apply
The ShAD Standards apply to all locations and scales of shrimp farm-based aquaculture production systems in the world, although it is expected that these standards will initially be of interest to producers trading internationally. For countries that intend to bolster economic development by accessing green-end markets, it is expected that the adoption of the standards for shrimp produced for export will contribute indirectly to improving local regulations and shrimp production practices. The standards are equally applicable to domestic producers producing for national markets that value responsible and stable production.

Species covered by the ShAD Standards
The ShAD Standards currently covers species under the genus *Liptopenaeus* and *Penaeus.* The ShAD Standards are oriented toward the production for *L. vannamei* and *P. monodon.* Other species of shrimp are eligible for certification if they can meet the performance thresholds specified in the document. Standards specific to other shrimp species may or may not be added in the future.

[8] See The Consortium on Shrimp Farming and the Environment (2006)

Unit of certification to which the standards apply
Given that the focus of the ShAD Standards is on production, the unit of certification is the farming operation, which will typically consist of a single farm or some other type of collective grouping. The unit of certification could be a group or cluster of independently-owned facilities or operations that can, for a number of reasons, be considered collectively as a single "aquaculture operation." For example, producers may share resources or infrastructure (e.g., water sources or an effluent discharge system), share a landscape unit (e.g., a watershed), have the same production system and/or have a common market outlet. Regardless of the specific situation, farms and other users can often have cumulative effects on the environment and society. As a result, some of the ShAD Standards are independent of what a producer can achieve at the farm level and rely on the efforts of the producer to act as an advocate and steward of their environment. Specific data collection protocols will be described in the ShAD Standards guidance document.

Under the compliance assessment of the ShAD Standards, part of the unit of certification determination will include the geographic and/or receiving water-body delineations in which the farm cultures or discharges. In this context, a company that owns multiple grow-out sites will be subject to compliance at the particular site or sites that are to undergo certification. Certifications will not be transferable to other farms or production systems that do not undergo auditing.

The GSC recognizes that the cost of an audit under the ShAD Standards may be significant, as it may require four or five days of auditing with two auditors who have knowledge and understanding of both social and ecological issues.

Operations will be audited through farm records and through supply-chain records where necessary. The GSC recognizes the auditing challenges associated with feed and seed sourcing standards, particularly in non-vertically integrated operations. However, farm input issues such as feed were identified as critical issues to be addressed to ensure the credibility of the ShAD Standards. The GSC is, therefore, committed to finding solutions for these challenges such as the promotion of a feed and/or hatchery dialogue.

The GSC is also aware that the scope of various Principles in the Standards varies. While key environmental issues such as the responsible sourcing of forage fish are considered and exceed the farm scale, other issues such as responsible social practices at processing plants or in reduction meal mills are not. These decisions were based on the interests and core concerns of participants in the process, rather than by attempting to create a consistent scope on all issues.

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

The Standards focus on the environmental and social impacts of trout farming. Food safety, sentient fish welfare and the nutritional value of farmed shrimp are not addressed directly in the standards. However, they are dealt with indirectly through health management, water quality, feed composition and other standards.

Consumption and sustainability

The ShAD GSC also acknowledges that addressing the global consumption of farmed shrimp was an important issue for many stakeholders. However, addressing consumption was not directly part of the ShAD mandate and falls outside the scope of a production standard; thus, it is not directly addressed by the ShAD Standards, although many members of the GSC recognize it as an important issue. The transparency required of farms through certification will assist this discussion by more rigorously

accounting for the environmental and social costs associated with shrimp aquaculture, while also allowing shrimp aquaculture to be fairly evaluated in the context of other seafood and terrestrial protein production.

Timeline and key events for the Shrimp Aquaculture Dialogue Standards

The Consortium on Shrimp Farming and the Environment was created in 1999. The consortium included representatives from WWF, Food and Agriculture Organization of the United Nations (FAO), World Bank, Network of Aquaculture Centers of Asia-Pacific and the United Nations Environment Program. Members of the consortium identified the key negative environmental and social impacts associated with shrimp aquaculture and developed principles that address the impacts. The consortium's work was based on discussions at 140 meetings with more than 8,000 people and the publication of 40 case studies by 120 researchers.

The final principles produced by the consortium were adopted in 2006 by FAO. Under the leadership of WWF USA, the ShAD Standards process was initiated in 2007. The impacts and principles identified by the consortium were the foundation for the ShAD Standards' future work in creating criteria, indicators and standards. Although the Consortium Principles were the starting point, the ShAD Standards were not bound to them in any way, and the final ShAD Standards principles reflect an adaptation of the Consortium Principles.

In 2007, ShAD Standards participants agreed on the www.worldwildlife.org/what/globalmarkets/aquaculture/WWFBinaryitem5383.pdf goals and objectives for the ShAD Standards.
In 2007, WWF USA notified ISEAL of the intent to apply the "Code of Good Practice for Setting Social and Environmental Standards" to the ShAD Standards. ISEAL accepted WWF USA as an associate member on behalf of all of the Aquaculture Dialogues.
In 2007 and 2008, three Regional Steering Committees were formed, with volunteers representing organizations with activities or interests in Asia, the Americas and East Africa.
In 2009, the GSC was made up mainly of volunteer members of the regional committees, and no one was prevented from participating on the GSC early in the process.
In 2010, after the first public comment, there were a few requests made to the GSC for membership. The GSC evaluated these requests and determined membership by a group vote.
The draft standards document was posted for two 60-day public comment periods before being finalized. The first public comment period was from March 1 to April 29, 2010. The second comment period was from December 1, 2010 to February 1, 2011.
Early in 2011, two members of the GSC were appointed to represent the ShAD and the implementation of the standards with the ASC.
In 2011, Version 3 of the standards will be finalized and used to develop the guidance. Field testing of the standards will also be conducted.
Late in 2011 or early 2012, the standards will be handed over to the ASC.

Table 1 – Names and affiliations of current GSC members

	Name	Organization	Sector	Country
1	Eric Bernard	OSO, R&O Seafood Gastronomy	Producer & Distributor	Madagascar, EU
2	Pete Bridson	Monterey Bay Aquarium	NGO	USA
3	Flavio Corsin/ Pham Anh Tuan	ICAFIS/MARD[9]	Producer/ Government	Vietnam
4	Laurent Galloux	Bureau VERITAS	Certification	France
5	Dominique Gautier	Aqua Star	Distributor	UK
6	Marc Le Groumellec	Groupe UNIMA	Producer	Madagascar
7	Alvin Henderson	Belize Shrimp Growers Association	Producer	Belize
8	Teresa Ish	Fish Choice	NGO	USA
9	S. Jahangir Hasan Masum	Coastal Development Partnership (CDP)	NGO	Bangladesh
10	Ernesto Jack Morales	Sustainable Fisheries Partnerships	NGO	Philippines
11	Sian Morgan	FishWise	NGO	USA
12	Leo van Mulekom	OXFAM Novib	NGO	Netherlands
13	Mathew Parr	IUCN NL	NGO	Netherlands
14	Jose Villalon	World Wildlife Fund USA	NGO	USA
Coordination team				
Merrick Hoben	Consensus Building Institute		USA	
Corey Peet	Coordinator		Canada	

The GSC created a process document for the ShAD (based on the general process document for the Aquaculture Dialogues) that includes criteria for decision making, commitments of GSC members, criteria for membership, etc.[10] From April 2007 – March 2010, six ShAD Standards Dialogue meetings (Table 2) were held to discuss potential criteria, indicators and standards.

[9] NOTE: this is a shared GSC seat that only has 1 vote
[10] See Appendix VII (www.worldwildlife.org/shrimpdialogue)

Table 2 – Dates and locations of shrimp aquaculture dialogue public meetings

Date	Location	Participants
April 2007	Antananarivo, Madagascar	65
April 1 – 2, 2008	Belize City, Belize	54
June 3 – 4, 2008	Antananarivo, Madagascar	62
October 9 – 10, 2008	Guayaquil, Ecuador	55
November 17 – 18 2008	Bangkok, Thailand	158
March 9 – 10, 2010	Jakarta, Indonesia	110

From April 2009 to November 2010, the GSC held five multi-day meetings (two to four days each) to develop and refine the ShAD Standards; develop draft criteria, indicators and standards; and develop and refine the ShAD's outreach strategy. Additional GSC meetings will be held prior to the completion of the ShAD Standards process.

Table 3 – Dates and locations of GSC meetings

#	Date	Location	Days
1	April 2009	Brussels, Belgium	2
2	June 2009	Paris, France	3
3	September 2009	Paris, France	3
4	November 2009	Bangkok, Thailand	3
5	February 2010	Paris, France	3
6	March 2010	Jakarta, Indonesia	1
7	June 2010	Washington (DC), USA	3
8	September 2010	Paris, France	4
9	February 2011	Vancouver, Canada	1
10	February 2011	Amsterdam, Netherlands	3

The ShAD began outreach with key stakeholders (i.e., producers in major production countries identified by GSC referral or participation in Full Dialogue meetings) and regions in April 2009 and has done its best to communicate the process to all interested stakeholders. Further efforts were made during the second public comment period.

Throughout the development process, WWF US disseminated press releases and developed/updated the ShAD website to keep people informed of upcoming meetings and progress within the ShAD.

Continuous improvement of the Shrimp Aquaculture Dialogue Standards

As stated in the ISEAL "Code of Good Practices for Setting Social and Environmental Standards," standards shall be reviewed on a periodic basis for continued relevance and effectiveness in meeting their stated objectives and, if necessary, revised in a timely manner. It is implicit in the development of the ShAD Standards that the numerical values, or tolerance levels, will be raised or lowered over time to reflect new data, improved practices and new technology. These changes will correspond to a lessening of impacts rather than an increase. Changes to other components of the ShAD Standards are also

recognized as a way to reward better performance. It is the expectation of the GSC that the ASC will implement the proper mechanism to review and continuously improve the standards.

Expectations of the Shrimp Aquaculture Dialogue GSC for standards implementation by the ASC

The mechanism for setting the ShAD Standards included assumptions that the spirit and vision that the ShAD GSC used to create the standards is upheld by the governance mechanism of the ASC for implementation and use of the standards. Although two members of the GSC will serve on the ASC Technical Advisory Group (TAG) that will help the ASC implement the standards, members of the ShAD Standards GSC reserve the right to publicly comment on the implementation of the ShAD Standards by the ASC.

How to read this document

The ShAD Standards are divided into seven principles, the introduction and appendices. Within each principle, there is an impact statement (IS) identifying what is trying to be minimized and multiple tables that lay out the indicators and corresponding Standards that are addressed based on the identified criteria. For each criterion, a rationale section explains the conceptual framing behind the inclusion of the given content, including the nature and evidence for the impacts being addressed. The rationale section also explains the GSC's thinking on how to address the issue either immediately with the proposed standard or by articulating the path to continuous improvement.

The guidance section is presented after the rationale and provides further explanations of how each standard will be interpreted by auditors or implemented at the farm level. The GSC has included the guidance section in the standards document, as it is a key part of judging the credibility of the standard. Guidance will be expanded and also moved into a separate document once the standard is finalized later in 2011.

Definitions and additional information are provided in footnotes. Additional appendices that help clarify the scientific rationale for key issues (e.g., issues about exotic species) are available on the ShAD website.

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

1.1 Rationale

Around the world, government regulation has not been able to regulate industrial activities effectively due to the often paradoxical challenge of promoting economic growth while maintaining biodiversity conservation. This has resulted in significant environmental and social impacts in both developed and developing countries.

Principle 1 requires certified shrimp producers to follow the 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 rigor of the legislative system of the producing country/region; rather, it ensures that the basic starting point for a shrimp farm seeking certification under these standards is compliance with national and local laws. In other words, the farm must be legal where it operates. Where necessary in subsequent principles, the ShAD Standards go beyond the minimum legal requirements to produce more rigorous standards.

Public transparency was included in the standards to ensure that communities that are potentially affected by the activities of the shrimp farm have access to information to ensure that the farm is operating responsibly within the country's legal system. The GSC believes that this increases the probability of both the communities and farmers acting as responsible neighbors.

The major challenge for the ShAD Standards regarding Principle 1 is how auditors can effectively determine a farm's compliance with the law without the ShAD Standards specifying which laws are important. In addition to auditor in-country experience and training, the ShAD Standards intend for producers to present auditors with evidence to demonstrate their 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 ShAD Standards Principles, thus rendering the need for legislative evaluations unnecessary.

Guidance for implementation

1.1.1: The farmer must provide a written list of all operational activities and present evidence of all relevant permits including but not limited to the following: farm permits including date of issue, concessions and rights to land and/or water use, including lease agreement if relevant (e.g., legal actions against the companies), importation and movement of broodstock or postlarvae, medicine or chemical use, waste disposal, wastewater discharge, labor and predator control. Documents must demonstrate that facilities were duly permitted or grandfathered. The farmer is required to provide evidence of

compliance with any applicable law.

1.1.2: "Publicly available" is defined as "in a manner easily accessible to or observable by the public," which includes, but is not limited to, the following: consistently and reliably posted in a public place (e.g., farm signage, storefront window or on the wall of an office that is accessible to the public), or available by email, post upon request or posted on internet websites. Requests "within reason" shall be provided a response within a two-week period (or 14 working days) of receiving the request. If more time is needed to provide the information, a justification or reason shall be provided to the member of the public (and documented) for the delay. A maximum of one month is allowed to provide the information.

Principle 2: Site farms in environmentally suitable locations while conserving biodiversity and important natural ecosystems

Impact: Inappropriate and unplanned siting of shrimp farms has the potential to result in production failures, ecological degradation, land use conflicts and social injustice. Thus, it is imperative when shrimp farms are created that due consideration is given to the environment, ecologically sensitive habitats, other land use in the vicinity and the sustainability of the shrimp farming operations.[11] Principle 2 covers the impacts associated with the initial siting and the construction and expansion of shrimp 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 ShAD Standards consider 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, recognizing that such agreements represent general international consensus on key biodiversity issues. The standards recognize the need to conserve biodiversity at the ecosystem, habitat and species levels. In addition to patterns of biodiversity, the standards aim 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 standards have been designed with the strong intent to direct stakeholders and governments toward a broader appreciation of biodiversity by incorporating planning tools that reflect ecosystem values.

Figure 1 – Both the B-EIA process and the Participatory Social Impact Assessment (pSIA – see Principle 3) allow for honest dialogue with stakeholders around the farms. This process helps 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)

	Indicator	Standards
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

Rationale for 2.1

Data availability (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 information challenges facing standards development and implementation. Given the potential impact of shrimp farming on biodiversity due to farm siting (see Rationale 2.2) and the complexities of defining site-specific critical habitats and ecosystem impacts, the ShAD Standards

[11] As noted in the International Principles for Shrimp farming (FAO 2006), advantage should be taken of improved techniques that take into account not only the requirements of the cultured shrimp and the management of the farm, but also integrate the farm into the local environment whilst causing the minimum possible disturbance other surrounding ecosystem.

mandate the use of B-EIAs for existing farms and prior to the development of new shrimp farms or the expansion of existing ones. Transparency and public disclosure of Environmental Impacts Statements is also an effective method to ensure that a B-EIA process is relevant, fair and credible, and B-EIAs under the ShAD Standards are required to be transparent.

A framework and guidance for B-EIA has been developed by the Convention on Biodiversity[12] as a way to integrate biodiversity issues into EIAs, an existing and effective planning tool. B-EIAs are mandated by the ShAD Standards 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 ShAD Standards. 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.

The benefits of B-EIAs to shrimp farmers are that they will obtain a deeper understanding of the importance of the local ecosystem to the sustainability and success of their operation and will be able to identify which elements of their surrounding ecosystem are important. 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 ShAD Standards recognize that the costs associated with assessments could be a significant barrier for many farmers interested in ShAD Standards certification, and it is expected that mechanisms will be developed at the ASC level to address this issue.

Continuous improvement for 2.1

The ShAD Standards 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 Standards will revisit these ideas, and it is expected that the identification of HCVAs will be required by the Standards 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 Standards 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 ShAD Standards are revised.

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.

[12] See COP 6 Decision VI/7 - http://www.cbd.int/decision/cop/?id=7181

Criterion 2.2: Conservation of protected areas or critical habitats

	Indicator	Standards
2.2.1[13]	Allowance for siting in Protected Areas (PAs).	None, except within PAs with IUCN category V if the farming system is regarded as traditional land use[14], 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 shrimp farming is no more than 25% of the total PA area.[15]
2.2.2	Allowance for siting in mangrove ecosystems[16] and other natural wetlands,[17] or areas of ecological importance as determined by the B-EIA or national/state/local authority plans/list.	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 rehabilitated[18] as compensation. 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). [19]

Rationale for 2.2

[13] **Protected Areas** : A protected area is "A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values". Source: Dudley, N. (Editor) (2008), Guidelines for Applying Protected Area Management Categories, Gland, Switzerland: IUCN. x + 86pp. PAs can be determined as National, state, provincial and local PAs.

[14] **Definition**: "Traditional [land use] aquaculture is 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 aquacultural systems." (Adapted from Miguel A. Altieri, Department of Environmental Science, Policy and Management, University of California, Berkeley)

[15] Other instances of certification within PAs, for example Category IV PAs which are zoned into different use area, will have to be considered on a case by case basis by the ASC Technical Advisory Group in consultation with the specific PA Management authority.

[16] **Mangrove Ecosystems** : Mangrove forests are among the world's most productive ecosystems. These are often called as 'tidal forests', 'coastal woodlands' or 'oceanic rainforests'. Mangroves are woody plants that grow in tropical and subtropical latitudes along the land-sea interface, bays, estuaries, lagoons, backwaters, and in the rivers, reaching upstream up to the point where the water still remains saline (Qasim, l998). These plants and their associated organisms (microbes, fungi, other plants and animals), constitute the 'mangrove forest community' or 'mangal' (See Tomlinson PB (1986) The Botany of Mangroves. Cambridge, UK: Cambridge University Press. 413 p. for full list of true and associate mangrove plant species) The mangal and its associated abiotic factors constitute the mangrove ecosystem (Kathiresan and Bingham, 2001).

[17] **Natural Wetland :** For the purpose of this standard, natural wetlands are 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'. (Appendix 7. Ramsar Wetland Definition (Ramsar, Iran, 1971), Classification and Criteria for Internationally Important Wetlands. Under the Convention on Wetlands 'wetlands' are defined by Articles 1.1 and 2.1).

[18] Rehabilitation Appendix will be developed as part of the testing phase in 2011.

[19] Consideration of local government programs for restoration and their effectiveness is advised. 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).

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 shrimp farms. PAs are internationally recognized as a major tool in conserving species and ecosystems. They also provide a range of goods and services essential to the sustainable use of natural resources.

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 shrimp farms may occur within PA IUCN category V, if considered traditional land use, or VI according to the IUCN criteria and even IUCN category IV in some countries (which 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 PA may have specific zones within them where other uses are permitted (e.g., within category IV there is sometimes allowance for small zones of shrimp 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 only 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 ShAD Standards 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 very rich in biodiversity and are highly productive ecosystems. They are the grazing and breeding ground for many marine species and also provide habitat for a wide variety of resident and migratory birds. As such, they are considered to be critical habitats[20] and High Conservation Value Areas (HCVAs). HCVA methodologies are being developed rapidly in differing production contexts around the world.[21] However, these methodologies are not yet sufficiently developed for inclusion in the ShAD Standards.

One of the most critical impacts of shrimp farming has been the deforestation and impact 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%.[22] Mangroves serve critical ecosystem functions including stabilizing 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.[23]

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[20] ***Critical habitat:*** All criteria are from the 1984 US Fish and Wildlife Service criteria[20] for the designation of critical habitat under the Endangered Species Act. These criteria were updated in 2001 to include the National Marine Fisheries Service criteria. This definition is used as a minimum standard and if there are well defined national interpretations of critical habitats in a country, this can be applied in the standards, provided that the national interpretation is based on a more stringent definition compared with the 1984 US Fish and Wildlife Service's criteria. Critical habitat components are defined as:
1. Space: To allow for adequate population growth and normal behavior
2. Resources: Food water, air, light, minerals, or other nutritional or physiological requirements
3. Cover: or shelter
4. Reproduction: Sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal
5. Distribution: Habitats that are protected from disturbance or are representative of the historic geographical and ecological distribution of a species

[21] www.hcvnetwork.org

[22] Ecosystems and human well-being: current state and trends : findings of the Condition and Trends Working Group / edited by Rashid Hassan, Robert Scholes, Neville Ash. 2005. Pg. 521
Boyd, C.E. 2002. Mangrove and coastal aquaculture. Pp: 145-157. R.R. Stickney & J. P. McVey. Responsible Marine Aquaculture. Pp. 391.

[23] Twilley, R.R., Chen, R. H. &Hargis, T. 1992. Carbon sinks in mangroves and their implications to carbon budget of tropical coastal ecosystems. *Water, Air & Soil Pollution*. 64 (1-2) : 265-288

Wetlands provide fundamental ecological services and are regulators of water regimes and sources of biodiversity at all levels – species, genetic and ecosystem. Wetlands constitute a resource of great economic, scientific, cultural and recreational value for the community. Wetlands play a vital role in climate change adaptation and mitigation. Progressive encroachment and loss of wetlands causes serious and sometimes irreparable environmental damage to the provision of ecosystem services. Wetlands need to be restored and rehabilitated, whenever possible, and conserved by ensuring their wise use.

Guidance for implementation

2.2.1: The location of a farm relative to protected areas will be determined via the farm's geographical coordinates. These coordinates will be provided to the auditor (degrees and minutes latitude and longitude) with an accuracy of two decimals in the geographical minutes (e.g., 15º 22,65' N ; 22º 43,78' E using World Geodetic System 84 (WGS84) coordinates) and shall refer to the center of the production site (smaller sites, < 1 hectare) or the corners of the contours of the larger production sites (> 1 hectare). All farms must give their designation relative to IUCN PA status in their operations manual.

2.2.2: The Convention on Wetlands of International Importance, known as the Ramsar Convention, provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.[24]

Cutting mangroves or altering natural wetlands is only acceptable for building pumping stations and inlet/outlet canals. Under these standards, 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.[25]

[24] http://www.ramsar.org/

[25] **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	Standards
2.3.1	Allowance for siting farms[26] in critical habitats of endangered species[27] as defined by the IUCN Red List, national listing processes[28] or other official lists.[29]	None
2.3.2	Maintain habitats critical for endangered species within farm boundaries and implement protection measures of such areas.	Implement protection measures of habitats identified by the B-EIA process.[30]

Rationale for 2.3

Criterion 2.3 addresses habitat considerations for endangered species, recognizing 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 Species[31] is a global inventory of the conservation status of plant and animal species. A series of "Regional Red Lists" are produced by countries or organizations, which assess the risk of extinction to species within a political management unit. The IUCN Red List uses criteria that evaluate extinction risk that are relevant to all species and all regions of the world. ISRSP Standards refer to the four categories that confer the greatest risk (near threatened, vulnerable, endangered and critically endangered).

The ShAD Standards seek to identify and protect critical habitats for species at risk in areas where shrimp farms are located. While mangrove forests[32] and wetlands are acknowledged as habitats that provide valuable human and ecological services and regularly overlap with shrimp 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)[33]. Such information shows which life stages most influence population growth and, therefore, identifies which functional habitats with their corresponding behaviors deserve particular protection. For example, if a juvenile life stage is limiting, protecting foraging grounds for juveniles may

[26] Farms starting construction or expanding.

[27] Also known as an species at risk; 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. Guidance interpreting application of the Red List Categories and criteria can be found here: http://www.iucnredlist.org/apps/redlist/static/categories_criteria_3_1

[28] 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).

[29] Issued by any governmental or inter-governmental institution.

[30] A B-EIA must identify critical habitats for all species at risk on the proposed site and design constructions such as protecting these areas. The first requirement is that farmers are aware of the different species on their farm. Big farms shall seek an expert opinion while small farms may consider including local stakeholders. The B-EIA will allow the farmer to demonstrate compliance.

[31] www.**iucnredlist**.org

[32] **Mangrove Forest**: A mangrove forest is 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).

[33] Mangel, M. Levin, P. &Patil, A. 2006. Using life history and persistence criteria to prioritize habitats for management and conservation. *Ecological Applications*. 16(2): 797-806

be more important that protecting breeding grounds for adult life stages.

However, the real costs of intensive science to determine such information are prohibitive in the context of certification, particularly for small-scale farmers. Recognizing its limitations, the GSC 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 standard, farmers are required to monitor what species are on their site and ensure that they do not impact these important species during 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. The GSC recognizes the challenge of assessing the state of the farming site prior to its establishment; however, the standards require that farmers attempt to do so to the greatest extent possible.

Criterion 2.4: Ecological buffers, barriers and corridors

	Indicators	Standards
2.4.1	**Coastal barriers:** Minimum permanent barrier (or natural) between farm and marine environments.[34]	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[35] aquatic/brackish environments.[36]	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 for 2.4

Criterion 2.4 addresses the retention of biological features in relation to abiotic or landscape features. Coastal vegetation and mangroves in particular serve an important protective function for coastal communities by breaking onshore waves and winds at the land/sea interface, especially during storm

[34] For open coastlines and adjacent natural water bodies, the zone of natural vegetation must be 100 meters wide.
[35] Artificial canals or natural waterways that have undergone considerable man-made modification are not considered in this standard
[36] 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.

surges. The magnitude of energy absorption strongly depends on forest/soil attributes.[37] Coastal mangrove buffers are regularly from 100 meters to two kilometers in width[38] and may be much wider. Mangroves also stabilize soil against erosion and filter runoff entering coastal water from rivers.[39]

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 salinization: these concerns are currently covered under standards preventing salinization (Criterion 2.5) and therefore are not addressed through buffers.

Coastal Barriers: The ShAD Standards require 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 ShAD Standards acknowledge 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.[40] While other ShAD Standards address water quality and salinization, recommended widths for ecological concerns in buffer strips typically are much wider than those recommended for water quality concerns.[41]

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[42]) to examine how coastal buffers can vary along different sections of coastline. Such efforts are

[37] Attributes include: tree density, tree size/age (stem and root diameter) species of trees, shore slope, bathymetry and the amount of undergrowth, the spectral characteristics of incident waves and tidal stage upon entering forests stem and root diameter, shore slope, bathymetry, spectral characteristics of incident waves, and tidal stage upon entering the forest (Alongi 2008[37], Forbes &Broadhead, 2007).
[38] Haylor, G. & Bland, S. 2001. Integrating aquaculture into rural development in coastal and inland areas, In R.P. Subasinghe, P. Bueno, M.J. Phillips, C. Hough, S.E. McGladdery& J.R. Arthur, eds. Aquaculture in the Third Millennium. Technical Proceedings of the Conference on Aquaculture in the Third Millennium, Bangkok, Thailand, 20-25 February 2000. pp.73.81. NACA, Bangkok and FAO, Rome.
[39] Boyd, 2002
[40] Fischer, R. A., and Fischenich, J.C. (2000). "Design recommendations for riparian corridors and vegetated buffer strips," EMRRP Technical Notes Collection (ERDC TN-EMRRP-SR-24), U.S. Army Engineer Research and Development Center, Vicksburg, MS. www.wes.army.mil/el/emrrp
[41] Fischer, R. A., Martin, C. O., Barry, D. Q., Hoffman, K., Dickson, K. L., Zimmerman, E. G., and Elrod, D. A. (1999). "Corridors and vegetated buffer zones: A preliminary assessment and study design," Technical Report EL-99-3, U.S. Army Engineer Water ways Experiment Station, Vicksburg, MS., Fischer, R. A. (2000). "Widths of riparian zones for birds," EMRRP Technical Note Series, TN-EMRRP-SI-09, U.S. Army Engineer Research and Development Center, Vicksburg, MS.
[42] Koh, H.L., Teh, S.Y., Llu, P.L., Ismail, A.I.M., Lee, H.L. 2009; Simulations of Andaman 2004 tsunami for assessing impact on Malaysia. *Journal of Asian Earth Science*.;36(1): 74-83.

outside the scope of auditing or B-EIAs but are acknowledged as best practice 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.[43]

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 100 meters wide. For confined natural watercourses, such as rivers or streams, the zone of natural or restored vegetation must be at least 25 meters wide on both sides. Canals constructed after the release of the Standards cannot replace natural waterways.

Criterion 2.5: Prevention of salinization of freshwater and soil resources

	Indicator	Standards
2.5.1	Allowance for discharging saline water to natural freshwater bodies.[44]	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.[45]	No net increase of specific conductance over 1,500 µmhos per centimeter or chloride concentration over 300 milligrams per liter when compared to the first year of monitoring.[46]
2.5.4	Soil-specific conductance or chloride concentration in adjacent land ecosystems and agricultural fields.[47][48]	No net increase when compared to the first year of monitoring.
2.5.5	Specific conductance or chloride concentration of sediment prior to disposal outside the farm.	The specific conductance or chloride concentration values must not exceed those of the soil in the disposal area.[49]

[44] 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 µmhos per centimeter and a chloride concentration of less than 300 milligrams per liter. These values correspond to a 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 brackishwater bodies under these standards.

[45] 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.

[46] 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.

[47] 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

[48] Soil salinity must be measured 25 meters within adjacent land ecosystems and agricultural fields every six months. If salt contamination is detected at the 25-meter 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.

[49] 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.

2.5 Rationale

Shrimp ponds contain saline water and, if located above freshwater aquifers, infiltration through bottom soil may cause groundwater salinization (Boyd et al. 2006). Lateral seepage beneath or through pond embankments can also cause soil and surface water salinization 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 20 centimeters per month (Boyd 2009).

The ShAD Standards determined that shrimp 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). Salinization 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 salinization in surface freshwater bodies and non-saline soils near farms. The SHAD Standards determined that saline water must not be released in natural freshwater bodies. Many shrimp farms, especially those using intensive culture methods, accumulate sediments in ponds and canals, which are mechanically removed at times. Sediment disposal sites can cause salinization 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 salinization of surface soil. Water from sediment disposal areas can infiltrate and lead to the salinization 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 ShAD Standards require monitoring of chloride concentration or specific conductance levels in soil (including sediment disposal sites), surface water and groundwater near shrimp farms, as an increase will indicate salinization 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 ShAD Standards have set freshwater limits to 1,500 µmhos per centimeter specific conductance and 300 milligrams per liter of chloride. These levels are based on data presented by Boyd (2000) indicating that freshwater has < 1,000 milligrams per liter 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 shrimp farms. These devices are appropriate for salinities of approximately 2 or 3 ppt, but they are not sensitive enough for use in determining if shrimp farms are causing the salinization 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: The proposed procedure for measuring chloride or specific conductance in soils is derived from the method used by Boyd et al. (2006) for aquaculture pond soil. It involves taking a 20-gram sample of dry soil and placing it in a glass container, adding 40 milliliters of distilled water and shaking the mixture by hand for five minutes. The specific conductance can be measured directly in the solution or the solution can be filtered and the chloride concentration measured. Multiply measurement-specific conductance values by two to adjust for the dilution (40 milliliters of water for 20 grams of soil). Specific conductance values over 1,500 µmhos per centimeter or chloride concentrations

above 300 milligrams per liter indicate that the soil is slightly saline. The greater the specific conductance or chloride concentration values, the more saline the soil.

Principle 3: Develop and operate farms with consideration for surrounding communities[50]

Impact: Although shrimp 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 jeopardizing livelihoods.[51]

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

	Indicator	Standards
3.1.1	Farm owners shall commission or undertake a participatory Social Impact Assessment (p-SIA)[52] and disseminate results and outcome openly in locally appropriate language. Local government and at least one civil society organization 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.[53] 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.	The p-SIA report adheres to the steps outlined in Appendix II; is available in the local government, the community and through the chosen community civil organization; and the report lists dates of meetings and names of participants.

[50] **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:
- a state of organized society in small form (town, village, hamlet) that recognizes a single representative (leader, formal or informal)
- 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
- having a common good or a common interest and recognizing that, and been recognized as having that.
- A sense of common identity and characteristics ('we' versus 'them' feeling) on either/or social, cultural, economic, ethnic grounds.

[51] This principle seeks to minimize injustice or unrest in affected communities that may result for Shrimp 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, the GSC believes this standard represents a significant improvement from past and current social realities, and will seek to continuously strengthen them. The GSC has benchmarked ShAD social sustainability standards against widely accepted international public covenants and agreements, such as UN declarations on Human Rights, the Right to Development, the UN Declaration on the Rights of Indigenous Peoples (IPRA), the Millennium Development Goals, and the ILO core conventions. Examples of covenants with the private sector include: OECD Guidelines for multinational corporations, the UN Global Compact on Corporate Social Responsibility and ISO 26000. A more detailed benchmark is set by existing and developing protocols in Multi-Stakeholder Initiatives such as the Roundtable on Sustainable Palm oil, Ethical Tea Partnership, Forest Stewardship Council and in standards such as SA8000 and ETI. See also appendix 2 for further reading.

[52] **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 that steps taken and information gathered is openly accessible to all. See Appendix II

[53] Stakeholder definition: 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.

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 organization. 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 to farmers and auditors are provided below.

NOTE: See Appendix II for the complete outline required for the p-SIA.

3.1 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. In particular, appropriate consultation must be undertaken within local communities so that potential conflicts are properly identified, avoided, minimized and/or mitigated through open and transparent negotiations on the basis of an assessment toward 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 standards 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.

Criterion 3.2: Complaints by affected stakeholders are being resolved

	Indicator	Standards
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.	Completed
3.2.2	Areas of conflict[54] or dispute are recorded and shared among farm, local government and surrounding community	Completed

[54] Conflicts, for the purpose of this standard, are situations wherein one party perceives hindrance in legitimate interest as caused by the other party's actions or absence of actions. One party is the farm owner or manager. The other party is either a surrounding community or group of stakeholders in the community. Conflicts, for the purpose of this standard, do exclude complaints made by single individuals unless verified/supported by a community leader or community organization.
The farm may not necessarily be at fault if conflicts arise, but the farm shall exercise due diligence to avoid any harm done to the legitimate interests of people in the surrounding community. "Due diligence" is the effort made by an ordinarily prudent or reasonable party to avoid harm to another party.

	representatives. At least 50% of the conflicts shall be resolved[55] within one year from the date of being filed, and a total of 75% in the period between two successive audits.		

3.2 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 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 diligence (i.e., actively seek to determine and solve) with regard to complaints, provide the utmost effort to avoid doing harm to the interests of surrounding communities and provide evidence for this according to the standard.

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).

Criterion 3.3: Transparency in providing employment opportunities within local communities[56]

	Indicator	Standards
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 on a daily basis.[57]	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	Written and dated records of applications and interviews with applicants, including stating whether they are from

The farm may not necessarily be at fault if conflicts arise, but the farm shall exercise due diligence to avoid any harm done to the legitimate interests of people in the surrounding community. "Due diligence" is the effort made by an ordinarily prudent or reasonable party to avoid harm to another party.

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.

[55] 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).

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

[57] Not applicable if farm is found to hire >50% of their staff locally

	and merits (skills, experience or CV in the case of hired migrant worker).	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.

3.3 Rationale

Unskilled labor is common on all shrimp farms; therefore, shrimp aquaculture can be very beneficial to rural village economies as a major source of employment. However, shrimp farmers often resort to hiring workers from further away areas and asking them to stay on, or close to, the farm. In doing so, the potential value shrimp 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 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 traveled 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 standard 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 farming[58] arrangements (if practiced) are fair and transparent to the contract farmer

	Indicator	Standards
3.4.1	Written contract agreements	The contracts are written in an appropriate language[59], and co-signed copies are kept by both parties.
3.4.2	Contract provisions	The contracts comply with the Appendix (part A) on content of basic provisions to ensure that conditions of the agreement are mutually understood.
3.4.3	Transparency and openness of negotiations	Meetings between the purchaser and the contract farmers to discuss and negotiate agreements are held at least twice a year and

[58] **Contract farming:** Contract farming can be defined as an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forward agreements, frequently at predetermined prices. The arrangement also invariably involves the purchaser in providing a degree of production support through, for example, the supply of inputs and the provision of technical advice. The basis of such arrangements is a commitment on the part of the farmer to provide a specific commodity in quantities and at quality standards determined by the purchaser and a commitment on the part of the company to support the farmer's production and to purchase the commodity" (FAO).

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

		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.

3.4 Rationale

Contract farming arrangements are increasingly part of the business practices in the aquaculture sector. However, these arrangements do differ from labor contract arrangements in that the contract does not revolve around labor 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 the scope of this standard, contract farming applies to the farm owner/operator either in outsourcing (to another farm) or as a signatory party in a contract-farming arrangement with the receiver of the harvest. The concern that the standard is seeking to address is that contract farming arrangements are open to skewed, unequal and non-transparent arrangements. In short, 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. This should not be the case. Three specific indicators are set to ensure that the contracting process itself is fair and transparent.

Guidance for implementation

Please see Appendix III for more information.

Principle 4: Operate farms with responsible labor practices

Impact: Aquaculture, as any agricultural production system, often requires intensive labor. Many countries have national laws that address labor issues; however, these laws are not consistent in a global context and sometimes fall below internationally agreed-upon levels. The labor standards in this document are based on the core principles of the International Labour Organization (ILO) and other matters on which the UN has agreed that are considered to be the fundamental right of individuals. Particularly in developing countries, workers often live on or near the farm in a rural environment lacking good infrastructure and living conditions[60]. These standards apply to verbal or written contract-employed workers. 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" must be comparable to those for the formally employed, but the ShAD Standards recognize a more flexible arrangement between employer and workers (see footnote [61]) in this case.

Criterion 4.1: Child labor and young workers[62]

	Indicator	Standards
4.1.1	Minimum age of hired workers.	18 years of age.

4.1 Rationale

Adherence to the child labor codes and definitions included in this section indicates compliance with what the ILO and related international conventions generally recognize as the key areas for the protection of children[63] and young workers[64]. 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 shrimp 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 standards related to what constitutes child labor will protect the interests of children and young workers in certified aquaculture operations.

[60] Please note that many countries have national laws that address labor issues rigorously and intensively, however this is not consistent in a global context. Addressing these key issues in aquaculture is critical, given the important human rights implications and proven societal benefits of labor standards related to poverty, sustainable economic growth, good governance and political stability. The labor standards in this document help ensure that all aquaculture operations certified against the ShAD standards have reduced or eliminated the potential impacts of key labor issues associated with production. Moreover, the ShAD labor standards are based on the core principles of the International Labor Organization (ILO): freedom of association, the right to collective bargaining, prohibition on forced labor, prohibition on child labor, and freedom from discrimination, as well as the other elements that are considered to be the fundamental rights at work: fair wages and working hours, decent health and safety conditions and non-abusive disciplinary practices. Social Accountability International (SAI), an international and renowned social standards/labor NGO recommended ways to best align the standards with best practice labor standards, including ILO conventions.

[61] **A (permanent) hired** worker is defined as 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 labor, for specific short activities with the maximum duration of two weeks, such as harvesting, is not considered permanent hired labor. **A family-worker** is defined as being 1st or 2nd degree blood-related to the primary owner (male/female) 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 does not make a difference. Workers partially paid according to time/days and partially paid through share in product sales are considered 'hired workers'.

[62] **Child Labor:** refers to any work by a child younger than the age specified in definition of a child, except for light work as provided for by ILO Convention 138, article 7. The conventions permit children between 15 and 17 to work on farms, provided that time for school and play is guaranteed and children are excluded from hazardous, abusive and physically hard work.

[63] **Child:** any person 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.

[64] **Worker (Young worker):** Any worker or employee between the age of child as defined and under the age of 18.

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 jeopardize school attendance and that they are not involved in hazardous work[65] (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 compulsory labor[66]

	Indicator	Standards
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.
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.

4.2 Rationale

Forced labor[67] – 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 to determining that labor is not forced. The inability of a worker to freely leave the workplace and/or an employer withholding original identity documents of workers are indicators that employment may not be at-will. Hired workers[68] shall always be permitted to leave the workplace and manage their own time. Employers[69] 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 labor forces.

Guidance for implementation

4.2.1: Forced, bonded or compulsory labor

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, lunches, transport, etc., if and when the employer

[65] **Hazardous work**: work which, by its nature or circumstances in which it is carried out, is likely to harm the health, safety or morals of workers.
[66] **Bonded Labor:** when a person is forced by the employer or creditor to work to repay a financial debt to the crediting agency.
[67] **Forced (Compulsory) Labor:** all work or service that is extracted from any person under the menace of any penalty for which a person has not offered him/ herself voluntarily or for which such work or service is demanded as a repayment of debt. "Penalty" can imply monetary sanctions, physical punishment, or the loss of rights and privileges or restriction of movement (withholding of identity documents).
[68] **Employee(Hired worker):** An employee is a person who enters an agreement, which may be formal or informal, with an enterprise to work for the enterprise in return for remuneration in cash or in kind. In this standard referred to as 'hired worker'.
[69] **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.

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 the moment of job termination.
The employer shall never be permitted to withhold and retain a hired worker's original identity documents. (Note: 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.

Criterion 4.3: Discrimination[70] in the work environment

	Indicator	Standards
4.3.1	Anti-discrimination policy in place, including, but not limited to, how to deal with discrimination in the workplace and equal access to all jobs in relation to gender, age, origin (locals vs. migrants), race or religion, and outlining clear and transparent company procedures are to raise/file and respond to discrimination complaints. Clear and transparent company procedures are outlined to raise/file and respond to discrimination complaints.	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.
4.3.2	Number of incidences of discrimination	None
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.	Evidence of equality of salaries and opportunities.
4.3.4	Respect of maternity rights and benefits.	Employers shall not test for pregnancy and shall not sanction and/or dismiss on the basis of marital status and shall

[70] **Discrimination:** any distinction, exclusion, or preferences, which has the effect of nullifying or impairing equality of opportunity or treatment. Not all distinction, exclusion, or preference constitutes discrimination. For instance, a merit or performance based pay increase or bonus is not by itself discriminatory. Positive discrimination in favor of people from certain underrepresented groups may be legal in some countries.

		guarantee legal rights to pregnancy/maternity leave.

4.3 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 minimization of discrimination. Differences in quality of work between equal workers can be rewarded through discretionary bonus payments on top of 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	Standards
4.4.1	Percentage of workers trained in health and safety practices, procedures and policies relevant to the job. Safety equipment provided and maintained and in use.	100% of workers trained. Certificates of training issued by the relevant competent national or provincial authority or by such an authority-recognized training center are required for operations with more than five employees[71] and evidence that safety equipment is in use by workers.
4.4.2	Monitoring of accidents and incidents and corrective	All job-related accidents and incidents must be recorded,

[71] Certificate of training issued by the relevant competent national or provincial authority or by such authority recognized or recommended training centre or institution.

	actions.	and corrective actions must be documented and implemented.
4.4.3	Medical expenses coverage.	Employer must provide a proof of coverage of all expenses related to any accident/injury occurring under the responsibility of the employer when not covered under national law.

4.4 Rationale

A safe and healthy working environment is essential for protecting workers from harm. It is critical for a responsible aquaculture operation to minimize these risks. Some of the key risks to workers include workplace hazards[72] and accidents that can result in injury. Consistent and effective worker training in health and safety practices are an important preventative measure, as is providing workers 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 standards 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., migrant 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 trained and fully understand the training. If interviewed, workers need to exhibit knowledge and understanding of safety hazards and safety practices.

Workers trained in health and safety practices, procedures and policies

Minimization 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 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 imminent serious danger without seeking permission from the company.

Offer regular health and safety training for hired workers (once a year and for all new workers), including training on potential hazards and risk minimization.

4.4.2: Determining occurrences of health and safety-related accidents, and 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 with regard to occupational health and

[72] **Hazard:** The inherent potential to cause injury or damage to people's health—for instance unequipped to handle heavy machinery safely/ unprotected exposure to harmful chemicals.

safety violations. The recommendation is to include records of the number of incidents and the number of man-days lost due to incidents.
A corrective action plan shall be implemented in response to job-related accidents and violations of safety practices that have occurred. This needs to analyze 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[73] or "decent wages"

	Indicator	Standards
4.5.1	Minimum wage level as applicable to their specific job/task description.	All hired[74] workers, including temporary workers, must receive pay greater than or equal to legally set minimum wage according to country or region in country (whichever applies). Payments must be done: 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.
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	Evidence available confirming fair wages or gradual pay rises through time-series of pay slips in farm administration and in the hands of workers.

[73] **Fair or decent wages**: a wage level that enables workers to support the 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.

[74] **Permanent worker**: Persons whose main job is a permanent job or with a work contract of unlimited duration and regular workers whose contract last for 12 months and over.
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.

	allows for savings and/or pension payments.	
4.5.3	Punishment through infringement of workers' rights or wages.	No allowance for withholding any part or all of worker salaries, benefits or rights acquired or stipulated by law. Not even as punishment of (alleged) wrongdoings on the part of the worker (cf. ILO 29 and 105).
4.5.4	There is a mechanism for setting wages and benefits (including, if applicable, the combination of pay and harvest sharing arrangements).	Decision-making criteria and processes for wage and benefit adjustments are known by all workers.
4.5.5	Revolving labor-contract schemes designed to deny long-time workers full access to fair and equitable remuneration and other benefits.	Prohibited.

4.5 Rationale

Workers shall be paid wages that, at a minimum, meet the legal minimum wage, but also progress shall be made (through work policies, contract specifications or negotiations between management and workers according to Criterion 4.6) toward meeting the need for a surplus discretionary income out of which the worker can save and/or enjoy a pension income from. 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 labor conflict-resolution policy that tracks wage-related complaints and responses. It is important that the 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 in a clear and transparent manner will empower workers to negotiate effectively for fair and equitable wages that will, at a minimum, satisfy basic needs and a discretionary surplus. Revolving labor-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

Percentage of workers who are paid fair and decent wages

Employers shall ensure that wages paid for a standard working week (no more than 48 hours – see Criteria 4.8), and at a minimum, allows for a decent level of spending power as prevalent within the country of operation. Employers must also provide 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 province of the country 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.
Wage 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 pay slips 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 pay slip 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 a 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.
Labor-only contracting arrangement: The practice of hiring workers without establishing a formal employment relationship for the purpose of avoiding payment of regular wages or the provision of legally required benefits, such as health and safety protections.
A clear and transparent mechanism for wage setting shall be known to employees.
In case of payments per piece or per hour, the net benefit the worker takes home shall minimally be pro-rated based on the above.
Payments based on farm performance (harvest share or bonus) occur in shrimp 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 this standard.

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

	Indicator	Standards
4.6.1	Percentage of workers with access to trade unions, worker organizations, and/or have the ability to self-organize and the ability to bargain collectively[75] or to have access to representative(s) chosen by workers without management interference.	100% of workers have access, if they so choose, to worker organizations capable of representing them independently from the employer.
4.6.2	Members of unions or worker organizations are not discriminated against by employers.	Employers shall not interfere with or penalize workers for exercising their right of representation.

4.6 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

[75] **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.

negotiating fair compensation. This does not mean that all workers at a certified aquaculture operation must be in a trade union or similar organization, but no workers will be prohibited from accessing such organizations when they exist. If they do not exist or are illegal, companies must make it clear that they are willing to engage in a collective dialogue through a representative structure freely elected by the workers or freely chosen by workers to be represented by them.

Guidance for implementation

4.6.1: Freedom of association and collective bargaining

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 organization 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 organization permitted by the laws of the country, free of any form of interference from employers or competing organizations set up or backed by the employer. The ILO specifically prohibits "acts which are designated to promote the establishment of worker organizations or to support worker organizations by financial or other means, with the object of placing such organizations under the control of employers or employers' organizations."

Evidence provided will be cross-checked with the indicated union or by the organization 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	Standards
4.7.1	Fairness of disciplinary measures.	No instances of abuses.[76]
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.	Evidences that any instances have been addressed and resolved.

4.7 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

[76] Physically or mentally. **Mental Abuse:** characterized by the intentional use of power, including verbal abuse, isolation, sexual or racial harassment, intimidation, or threat of physical force.

support non-abusive disciplinary practices accompanied by evidence from worker testimony shall indicate compliance with this standard.

Guidance for Implementation

4.7.1: Disciplinary actions in the work environment

Determining incidences of abusive disciplinary actions

There shall be absolutely no engagement in or support of corporal punishment, mental or physical coercion, or verbal abuse. Fines or wage deductions shall not be acceptable as a method for disciplining workers, as indicated by policy statements and evidence from worker testimony.

Evidence of non-abusive disciplinary policies and procedures

If disciplinary action is required, progressive verbal and written warnings shall be engaged. The aim should always be 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	Standards
4.8.1	Maximum number of regular working hours: Eight 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.	Reflected in records available on the farm and 100% compliance expressed in worker interviews.[77]
4.8.2	Right to leave the farm after completion of daily work duties.	Evidence of freedom of movement for all employees.
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.	Four full 24-hour periods per month.
4.8.4	Transport provided to workers (in cases where farm locations are remote) to allow workers to enjoy relaxation at home, with	The farm owner shall provide transport to and from the first location from which regular public transport is available.

[77] Audits will check whether workers are familiar with the guidance (on 4.8.1.) and use worker interviews to check for compliance. Compliance expressed in interviews

[78] Premium rate: a rate of pay higher than the regular workweek rate. Must comply with national laws/regulations and/or fair wage standard. Must be 125% of normal rate or higher.

	family or in places of recreation of their choosing.	
4.8.5	Overtime compensation is provided.	Paid at a premium rate[78] of at least 25% above the wage for normal hours.
4.8.6	Overtime is voluntary, and not longer than 12 hours/week.	Occasionally (not on a regular basis).
4.8.7	Rights to maternity leave, including daily breaks or a reduction of hours of work to address child care needs.	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.

4.8 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.[78] Requirements for time off, working hours and compensation rates as described should reduce the impacts of overtime. With respect to women, ILO Convention 183, Article 11.2 (Criterion 4.8.6) shall be followed. Shrimp farming often involves long periods of stand-by labor (e.g., watching culture performance during the night; being on stand-by duty in case mishaps have to be corrected quickly, etc.). This makes criteria on overtime and stand-by duties necessary in this standard.

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 actually 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 organization (e.g., stand-by time), as paid workers remain at the disposal of their employer during these periods. Hours actually 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 normally are sufficiently long enough to be easily distinguished from work periods.

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 the majority 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).

All 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. Exceptions to this last requirement can be made 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 to 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 child care 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 child care shall minimally be at the level of in-country prevalent social minima provided by government in accordance to 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	Standards
4.9.1	Allowance for labor-only contracting relationships[79] or false apprenticeship schemes[80] including revolving/consecutive labor contracts to deny benefit accrual.	None.
4.9.2	All workers have the appropriate and applicable permits for working in the country.	Employer has a list of permit reference numbers or copies of permits for all concerned workers.
4.9.3	Workers are fully aware of their employment conditions and confirmed their agreement	Evidence of contract agreement for all workers.Written contracts: a complete contract

[79] **Labor-only contracting arrangement:** the practice of hiring workers without establishing a formal employment relationship for the purpose of avoiding payment of regular wages or the provision of legally required benefits, such as health and safety protection.
[80] **False Apprenticeship Scheme:** the practice of hiring workers under apprentice-ship terms without stipulating terms of the apprenticeship/ wages under contract. It is a "false" apprenticeship if its purpose is to underpay people, avoid legal obligations, or employ children.

	(verbal or written). Written employment policies and procedures are required when there are more than five hired workers.	is filed in the office, mutually signed and copies are available to the worker.Verbal agreements: employer and worker cite consistent employment conditions in independent interviews.
4.9.4	Probation period stipulated in contract.	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.[81]
4.9.5	In subcontracting[82] or home-working arrangements, the farm owner shall assure that labor laws, social security laws and ratified ILO provisions have been duly respected and complied with.	Evidence that sub-contractors and intermediaries have contracts with their workers that are in accordance with laws and regulations.

4.9 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 formalized paper-based contract and policy procedures. On farms with fewer workers, where farmer 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 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.

[81] If the law of the producing countries requires more, the law must be followed.

[82] **Sub-contracted worker:** not directly contracted by farm but through an intermediary party (sub-contractor).

4.9.5: Sub-contracting and home-working arrangements.

Sub-contracting crews for specific labor intensive tasks (e.g., harvesting, sorting) is common practice in shrimp aquaculture but often a sparsely or non-regulated part of the business. Through sub-contracting, such services on farms may unwittingly become associated with labor 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 standard 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 systems[83]

	Indicator	Standards
4.10.1	The employer ensures that all workers have access to appropriate channels of communication with managers on matters relating to labor rights and working conditions.	Management and the full workforce meet at least twice per year on the basis of written agendas and written minutes of the meetings are 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.

4.10 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 meetings on the basis of 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 organization 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.

[83] Applicable to farms with more than 5 workers.

Criterion 4.11: Living conditions for workers accommodated on the farm

	Indicator	Standards
4.11.1	Living conditions for workers accomodated 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 visibility privacy, such as walls, curtains or movable rattan/bamboo screens. Potable water and cooking facilities or catering facilities are available to all accomodated workers on the farm premises.
4.11.2[84]	Adequate facilities for women.	Separate and suitable sanitary and toilet facilities are available for men and women, with the possible exception of married couples being accommodated together.

4.11 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 harassments.

Guidance for implementation

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 labor codes (ILO, SA8000) also make reference to the availability of light, and the minimum private space per person of 4 m^2 in shared sleeping quarters.

[84] Applicable to farms with more than 5 workers

Principle 5: Manage shrimp health and welfare in a responsible manner

Impact: The culture of shrimp under stressful conditions can lead to the transfer of pathogens or the amplification of pathogens in the receiving waters. Additionally, heavy reliance on the use of therapeutic chemicals at shrimp aquaculture facilities can not only cause pollution but can also stimulate and/or introduce antibiotic resistant bacteria into the receiving waters, potentially having a negative effect on the local ecosystem.

Criterion 5.1: Disease prevention

	Indicator	Standard
5.1.1	Develop and maintain an operational health plan addressing: 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 pathogen(s), and monitor external signs of pathologies and moribund animals.	Demonstration that the operational health plan is functional.
5.1.2	Filtration of inlet water for minimizing the entry of pathogens.	Nets, grills, screens or barriers of the appropriate mesh size[85] are present on all farm or pond inlets.
5.1.3	Annual average farm survival rate[86] (SR): 1)Unfed and non-permanently aerated pond systems 2)Fed but non-permanently aerated pond[87] systems	SR >25% SR >45% SR >60%

[85] Justification of mesh size must be demonstrated to the auditor and be based on local disease risk factors (e.g. presence, likely vectors, etc)

[86] Survival rate does not include hatchery survival.

	3)Fed and permanently aerated pond systems	
5.1.4	Percent of stocked postlarvae (PLs) that are Specific Pathogen Free (SPF)[88] or Specific Pathogen Resistant (SPR)[89] for all important pathogens[90].	100% if commercially available[91], 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.

Rationale for 5.1

Prevention of disease is the absolute priority for this principle and the ShAD Standards emphasizes 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 ShAD Standards mandate 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 ShAD Standards do not specifically address food safety issues, which are supposed to be covered through either international or national legislation (refer to P1) and, if 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 ShAD Standards promote 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.

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[87] 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.

[88] **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.

[89] **Specific Pathogen Resistant** describes a genetic trait of a shrimp that confers some resistance against one specific pathogen. SPR shrimp 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.

[90] All diseases, for which the species farmed is susceptible, listed by the OIE or the national competent authority

[91] See Appendix for details on exceptions and SPR/ SPF eligibility

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 fairly consistent survival rates among ponds.

The level of control over pond conditions, which partly determines the prevention of diseases, varies greatly depending on the culture system, especially when differences in feeding and aeration practices are considered. Therefore, there are three different standards 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 ShAD Standards supports the use of Specific Pathogen Free (SPF) and Specific Pathogen Resistant (SPR) postlarvae 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), 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 ShAD Standards also recognize that checking broodstock in Asia may be challenging, but the GSC expects to see continuous improvement of farmers certified under this standard.

The ShAD Standards acknowledge 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 postlarvae 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 localized 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 WSD (e.g., as determined using gross signs and/or quick pond-side tests), does not discharge water to the natural environment, it would be in compliance with this standard. 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

Step 1 - Individual Pond Survival Rate Calculation

The estimated number of shrimp 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:

% Pond Survival Rate = [(Harvested Biomass/Average Body Weight)/Stocked PL Count] x 100

QUOTE 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 - *The Annual Average Survival Rate is the weighted average value for all ponds harvested during the last 12 months and is calculated as follows:*

SR in % = ((% $Pond_1$ Survival Rate x number to postlarvae stocked in pond 1)+ (% $Pond_2$ Survival Rate x number to postlarvae stocked in pond 2) + … + ($Pond_n$ Survival Rate x number to postlarvae stocked in pond n)) / Total number of postlarvae stocked in all ponds

A counting system will be important for the ShAD Standards to describe a method of counting PLs so that the SR measure is meaningful. All individual pond survival rates of 95% and above are assumed to result from an underestimation of postlarvae number and as a consequence cannot be included in the calculation of the annual average survival. The GSC is considering for guidance development an allowance for lower survival due to unexpected events, etc. over a time period as long as a measure of accountability can be demonstrated.

5.1.4: If more than 20% of a country's production uses SPF or SPR broodstock for a given species, farmers certified under this standard must do so as well. Precautions to be taken for SPR to be eligible will be defined further in the guidance. For non SPF or non-SPR seed to meet this standard, all World Organisation for Animal Health (OIE)[92]-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.

Criterion 5.2: Predator[93] control

	Indicator	Standard
5.2.1	Allowance for intentional lethal predator control of any protected, threatened or endangered species as defined by the International Union for Conservation of Nature (IUCN) Red List[94] national listing processes[95], or other official lists.[96]	None.
5.2.2	Allowance for use of lead shot and select chemicals for predator control.	None.

[92] http://www.oie.int

[93] **Predator:** Any animal that lives by preying on other animals.

[94] IUCN red lists can be accessed via www.**iucnredlist**.org.

[95] **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 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).

[96] Note: does not apply to pond water treatment and any aquatic animals that are contained within it

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.	Yes.

Rationale for 5.2

The predation of cultured shrimp by fish, birds, amphibians, reptiles and other crustaceans can result in significant negative economic impacts to farmers by 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 effect local biodiversity, especially when local predators (e.g., herons and egrets) become dependent on the reliable food source that shrimp farms provide. Although a consistent food supply is likely to enhance population numbers, it is also likely to change behavior and local dispersal patterns of affected species that may ultimately affect the health of the predator populations. The ShAD Standards determined that the intentional killing or harassment of protected, threatened or endangered animals that prey on cultured shrimp is inappropriate for farms certified under these standards. There, ShAD Standards are an allowance for limited lethal control of predators in exceptional situations, which must be appropriately documented by the farmer and made available for the auditor to a maximum of a yet undetermined number of occurrences per year.

Any lethal control must be exercised without the use of lead shots, as this has been found to have negative trophic and 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 (acceptable non-lethal methods will be included under the guidance section in the final version). Documentation must be provided to the auditor explaining the exceptional circumstances that led to the lethal control.

Guidance for implementation

5.2.1: This standard 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	Standards
5.3.1	Allowance for use of antibiotic and medicated feed on ASC-labeled products (farm can be certified but specific product	None.

	receiving medicated feed will not be authorized to carry ASC label).	
5.3.2	Allowance for the use of antibiotics categorized as essential or critically important by the World Health Organization[97] (WHO), even if authorized 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.	Evidences 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), the Stockholm Convention on Persistent Organic Pollutants (POPs) or the World Health Organization (WHO).	None.
5.3.6	Allowance for discharge of any hazardous chemicals[98] without previous neutralization[99].	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 for 5.3

It is the responsibility of the farmer to reduce the risk of spreading pathogens by taking adequate measures to contain diseased shrimp and dispose of dead shrimp 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., the adjustment of feed applications in the instance of pond mortality, the proper discarding of dead shrimp, etc.). The major goal of this criterion is to encourage farmers to develop the skills necessary to address disease management.

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[7] The 3rd edition of the WHO list of critically and highly important antimicrobials was released in 2009 and is available at http://www.who.int/foodborne_disease/resistance/CIA_3.pdf

[99] This does not mean that the discharge must be pH neutral; but need to ensure that chemicals are broken down and treated water must be held for the appropriate time before release to ensure that animals in the receiving waters are not killed. If water is discharged, the effect of lime would have been naturally neutralized by the time water is discharged. For chemicals applied to ponds, farmers need to wait until effect is neutralized before discharging the water. This indicator is meant to address the case of chemicals used during harvest (metabisulphite, chlorine) that could be dumped in public canals. The indicator has evolved to make it more general as some people are also worried with chemicals used in ponds. In this case, farmers just need to show that they do not discharge the water before some time. For chemicals used in harvest they need to throw the remains in some farm canal or settling pond, or neutralize it chemically before discharging to a public canal.

Use of antibiotics The shrimp industry has made progress to prevent disease outbreaks, 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 labeling of products treated with veterinary medicines is not allowed under these standards and shrimp from treated ponds cannot be sold under the ASC certification. Therefore, the ShAD Standards encourage the use of alternative disease prevention measures before medicinal treatments.

In the event that veterinary medicines and chemicals[100] are used, they must be based on a diagnostic test, and all labeled instructions must be precisely followed. The specialist shall also indicate how to apply, handle and store veterinary medicines and chemicals.

The use of antibiotics are permitted on farms certified to ASC however, shrimp in specific ponds that have received medicated feed are not authorized to carry the ASC label. Additionally, no farm will certify as ASC compliant if any use of a WHO categorized antibiotic as "essential" or "critically important" was administered to any shrimp.

Use of pesticides

Pesticides are used by some farms for eliminating pathogen carriers and competitors from water used to fill ponds prior to stocking shrimp postlarvae. The ShAD Standards 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 shrimp with Tea-seed-cake, Rotenone and chlorine. There is concern on the GSC that even these allowable pesticides could have negative impacts, as they do kill fish. Therefore, the standards require 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 shrimp farming in different forms and for different purposes. Probiotics are used to modify the microbial communities in the digestive tract of shrimp (as a feed additive) and in their aquatic environment (applied directly to the pond) with the objective of competing with and displacing pathogens, and as a result, improving shrimp growth and survival[101]. Probiotics are also used for improving pond water and soil quality.[102] 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 shrimp and humans.[103] On this basis, the ShAD Standards consider that the use of probiotics in shrimp culture needs to be restricted to commercially available microorganisms and only those approved by the appropriate authority.

<u>Guidance for implementation</u>

[100] All veterinary medicines and chemicals must

- Be approved for aquaculture by national authorities and by FDA list of drugs approved for aquaculture. and by the Council regulation EEC n°2377/90 Annex 1 and not listed on Annex 4
- Respect the withdrawal period or apply a period of 750 degree-days for those without documented withdrawal period times[47];

Never be used as growth promoters[48] or for preventive (prophylactic) treatment. This product will not be eligible for certification

[101] Moriarty and Decamp 2009

[102] Boyd and Gross 1998; Gatesoupe 1999

[103] Moriarty and Decamp 2009

5.3.1: This standard 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: To know the lists of banned or restricted pesticides, refer to the following documents:
Annex III of the Rotterdam Convention on Prior Informed Consent
http://www.pic.int/TheConvention/Chemicals/AnnexIIIChemicals/tabid/1132/language/en-US/Default.aspx
Stockholm Convention on Persistent Organic Pollutants. Annex A, B and C:
http://www.pops.int/documents/convtext/convtext_en.pdf"http://www.pops.int/documents/convtext/convtext_en.pdf
The WHO-recommended classification of pesticides by hazard and guidelines to classification:
http://www.who.int/ipcs/publications/pesticides_hazard_2009.pdf
5.3.6: All chemicals must be neutralized before discharging them into the environment and there can be no evidence of impacts from chemicals in adjacent ecosystems.
5.3.7: Only products authorized by competent authorities and disclosing the names of microorganisms included in the product are allowed for use in shrimp ponds. Farmers are responsible for verifying that the products they use do not contain any pathogenic (either for shrimp 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: Shrimp farming can have negative impacts on wild shrimp populations and the environment due to the collection of wild shrimp as postlarvae and broodstock, and the introduction and escapes of non-native shrimp species or of genetically distinct native species.

Criterion 6.1: Presence of exotic or introduced shrimp species

	Indicator	Standards
6.1.1	Use of non-indigenous shrimp species.[104]	Allowed, provided it is in commercial production locally[105] AND there is no evidence[106] 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[107]).
6.1.2	Prevention measures in place to prevent escapes at harvest and during grow-out include:	
	A. Effective screens or barriers of appropriate mesh size for the smallest animals present; double screened when non-indigenous species.	Yes
	B. Perimeter pond banks or dykes are of adequate height and construction to prevent breaching in exceptional flood events[108]	Yes
		Yes

[104] At the time of publication of these standards

[105] Locally: within the country of production

[106] The GSC recognizes that establishing "no evidence" is difficult and this issue will be monitored by the ASC Technical Advisory Group who will evaluate this on a case by case basis to determine how this should be applied in various localities

[107] International Council for the Exploration of the Sea

[108] Exceptional Flood Events= 25-year flood events

	C. Regular, timely inspections are performed and recorded in a permanent register	
	D. Timely repairs to the system are recorded	Yes
	E. Installation and management of trapping devices to sample for the existence of escapes; data is recorded	Yes
	F. Escape recovery protocols in place	Yes
		Yes
6.1.3 Escapes and actions taken to prevent reoccurrence.		Records are available for inspection.

6.1 Rationale

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

According to the FAO (FAO, 2005), 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 introducing non-native aquatic plants and animals that in some cases have become harmful invasive species.[109] Accidental or intentional introductions of non-native species have become an alarming global environmental problem.[110] The ShAD Standards define "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 ShAD Standards with regard to introductions of non-native species is to discourage introductions of farmed shrimp species into waterways where they are not native or previously established. Worldwide transfers and introductions of *Penaeus monodon (*henceforth *P. monodon)* and *L. vannamei* were widespread in the early history of shrimp culture (Rönnbäck 2002). Introductions occurred from Asia to Latin America in the form of *P. monodon* and vice versa in the form of *L. vannamei* (Phillips, Kwei Lin and Beveridge 1993; *Shrimp News International* 2009). The International Council for the Exploration of the Sea's Code of Practice on the Introduction and Transfer of Marine Organisms is

109 **Invasive species:** organism (usually transported by humans) which successfully establish themselves in, and then overcome, otherwise intact, pre-existing native ecosystems (http://www.issg.org/about_is.htm). Weigle, S.M., Smith, L.D., Carlton, J.T. & Pederson, J. 2005. Assessing the risk of introducing exotic species via the live marine species trade. Cons. Biol., 19: 213–223. Casal, C.M.V. 2006. Global documentation of fish introductions: the growing crisis and recommendations for action. Biol. Invasions, 8: 3–11.

110 Leung, K.M.Y. and Dudgeon, D. 2008. Ecological risk assessment and management of exotic organisms associated with aquaculture activities. In M.G. Bondad-Reantaso, J.R. Arthur and R.P. Subasinghe (eds). Understanding and applying risk analysis in aquaculture. FAO Fisheries and Aquaculture Technical Paper. No. 519. Rome, FAO. pp. 67–100.

one of the most comprehensive instruments to help in the responsible use of introduced species but is only voluntary. *L. 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 *L. 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; Naylor et al., 1997; Phillips, Kwei Lin and Beveridge 1993; Qing-Yin and Cong-Hai 2005). However, although there appears to be some specific examples of escapes occurring, there are little or no hard data on their ecological impact[111] (Briggs et al. 2005). However, *L. vannemei* represents the vast 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 have the ability to significantly disrupt ecosystem function and species interactions, in the case of *L. vannamei* there is currently no evidence[112] 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 ShAD Standards allows for the culture of *L. vannamei* in areas outside its native range, but does not allow it to be introduced into a new area. Future revisions of the Standards will respond to new research developments, and the ShAD Standards will change its position if the evidence suggests that there is a significant risk of impact to ecosystems due to the culture of *L. vannamei* in areas outside its native range.

Enough evidence[113] 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 in foreign habitats.

As for the farming of native species, there is potential for escapes to breed with wild shrimp of the same species, which could cause changes to the wild population's genetic structure (e.g., genetic drift). There

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[111] Despite documented escapes and concern about the impacts, there is no evidence of established populations in the wild. The last *L. vannamei* found in wild U.S. continentalwaters was in 1998, and most records occurred in the early 1990s (Perry 2009); perhaps related to the transition between open flow through and largely contained systems in coastal ponds in the mid-1990s (Treece 2002). In South Carolina, two exotic occurrences of *L. vannamei* have been recorded for the North Edisto River mouth (Charleston County) and from coastal waters (Wenner and Knott 1992). In Texas, six individual non-native *L. vannamei* have been collected from the Gulf of Mexico off Brownsville (Cameron County), Matagorda Bay, Laguna Madre (north of Arroyo Colorado), Port Mansfield (Willacy County) and at Palacios (Matagorda County) (Balboa et al. 1991, Howells 2001). The last and only time an escape was identified in Hawaiian waters was 1994, and one escape was noted in a canal connecting commercial aquaculture operations to La Plata River in Puerto Rico (Perry 2009).

[112] Literature reviews conducted on *L. vannamei* escapes found no evidence of *L. vannamei* becoming established outside of its range, but a precautionary approach still should be taken when farming *L. vannamei* (Briggs et al. 2005). Anecdotal evidence indicates *L. vannamei* has been caught in fishing nets in Thailand and *P. monodon* in the U.S., though the numbers reported are not large and may have been soon after a large number of shrimp escaped. *P monodon*, *L. vannamei*, *P. stylirostris* and *P. japonicus* are all known to have escaped from U.S. culture operations (Briggs et al. 2005). Farmed *P. japonicus* and *P. merguiensis* have escaped facilities in the Pacific Islands, with the latter now known to be established off Fiji (Briggs et al. 2005). There is a *P. monodon* fishery off of the Western Coast of Africa that is attributed to farmed escapements (failures) and there are established populations off the northern Coast of Brazil, Guyana, and the coast of North Carolina (S. Newman pers. comm., March 17, 2008; from Seafood Watch Mexico farmed shrimp report)
L. vannamei has been farmed in Thailand for over 15 years, and now dominates production in Asia. While *P. vannamei* has been found in natural water bodies, Briggs et al. (2005) and Senanan et al. (2007) were unable to find evidence that the shrimp they found in the wild were a reproducing population. None of the shrimp sampled in the Gulf of Thailand or Bangkapong estuary had achieved the sizes needed to reproduce.

[113] *P. monodon*, has been officially recorded 27 times in at least six US states including Alabama, (n=2), Hawaii (n=1), Florida (n=4), Louisiana (n=1), South Carolina (n=7), North Carolina (n=10) and Georgia (n=2) (Fuller 2009). However, at present, no *P. monodon* are reared on U.S. farms or in U.S. research facilities, and there are no known established populations in U.S. waters. Anecdotal evidence indicates that *P. monodon* may be spawning off the coast of Brazil in the Caribbean, based on the continued capture in the region with no active farms to continually supply individuals to the population.[113] In areas of West Africa, particularly in Cameroon and Nigeria, populations of escaped *P. monodon* have become sufficiently established to support a commercial fishery. Penaeid shrimp make up about 2% of Cameroon capture fisheries, and black tiger shrimp is a notable portion of this catch[113]. In Nigeria, tiger shrimp comprises as much as 10% of trawler catches since its arrival approximately 4 years ago. Interestingly, while Cameroon holds aquaculture in Nigeria responsible for the release, Nigeria has indicated that Gambia, Senegal or Cameroon may be responsible.[113]

is also concern about the movement of geographically or genetically distinct populations of animals due to shrimp aquaculture activities. In both cases, new genes could be introduced into the wild population via escapes, which could affect the health of wild shrimp species. Currently, the ShAD Standards do not have restrictions on the use of native species but escape management standards are included.

Risk assessment is a key approach to determining whether shrimp in existing or proposed facilities are likely to escape and become established. However, risk assessment is controversial and some of the assessments 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 both *L. vannamei* and *P. monodon*. This situation posed a significant challenge to the ShAD Standards, as it 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 shrimp species in countries where they are 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 vector for the introduction of exotic species and, in some cases, the escape of native species has been found to have significant impacts on native wild species (e.g., salmon aquaculture). Escaped shrimp 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 shrimp 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 ShAD Standards address the issue of escapes via a series of BMPs (e.g., physical infrastructure to limit risks of potential escapes), data collection and record keeping. This will serve as a first step for these Standards and will help the development of performance-based ShAD Standards. Percent recovery standards were also considered, but it is not currently feasible to accurately count the number of shrimp 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 Standards, when escape data are more available and counting technologies are more advanced.

Severe weather events are the most likely cause of catastrophic escapes from shrimp farms. The ShAD Standards require that shrimp 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. For 6.1.1a, double screens must be in place. Farmers must provide hatchery permits and import licenses. More information on ICES code of practice on the introductions and transfers of marine organisms can be found at http://www.ices.dk/reports/general/2004/icescop2004.pdf) . Farmers must demonstrate that they have a working knowledge of the guidelines and have complied with them for culturing a non-native species. The ShAD Standards consider 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 standards. The introduction of new/exotic/non-indigenous species must also be in compliance 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 ShAD Standards recognize the challenges of recording all escapes but expects farmers to do due diligence on this standard and record any observed escapees.

Criterion 6.2: Origin of postlarvae or broodstock

	Indicator	Standards
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)•Documentation provided demonstrating compliance within two years of standards publication date for wild monodon broodstock sourced locally; applicable immediately in all other cases.
6.2.2	Percent of total postlarvae from closed loop hatchery (i.e., farm-raised broodstock).	*P. vannamei, P. indicus, P. stylirostris* 100%*P. monodon* must be increased over time, and reach 100% within six years after the publication of the standards.
6.2.3	Origin of wild-caught broodstock.	Sourced from locally fished broodstock only.[114]
6.2.4	Allowance for wild-caught PL other than natural tidal flow into ponds.	None.

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

The wild collection of PL added to the disease problems that the shrimp aquaculture industry experienced in addition to causing high by-catch of untargeted marine species and impacts to the health of wild shrimp populations. The ShAD Standards do not allow the collection of wild PL, employs strict indicators and standards for what species and stocks can be collected for broodstock and limits the amount of shrimp broodstock that can be collected overall. Wild stock monitoring systems must be enforced via government methods, stock assessments or quota systems. The ShAD Standards are willing to make an exception for natural influx systems that use wild PL, provided those systems are in compliance with all other parts of the ShAD Standards.

The shrimp aquaculture industry has increased its capacity to produce *L. vannamei* via farm-raised broodstock and hatchery production, which has nearly eliminated the industry's reliance on wild stocks as a PL source. While hatchery production still necessitates the occasional collection of some wild-caught broodstock for genetic enhancement, the potential impact of this activity is far less significant than using wild-caught PL. The ShAD Standards require that 100% of *L. vannamei* PL are from a closed loop

[114] Sourced from the same country, water body, and/or genetic subpopulation

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

For *P. monodon,* spawning in captivity is much more challenging and the standards currently allow for the wild capture of broodstock. However, a reduction in the use of wild-caught broodstock must be demonstrated over time and the ShAD Standards will require 100% to be hatchery-sourced within six years after the publication of the standards. It is expected that this will allow enough time for commercial hatchery and domestication[115] technology for *P. monodon* to become established. Wild-caught broodstock will still be permitted for genetic enhancement purposes without time limitation for both *P. monodon* and *L. vannamei*. The only exception to this is for extensive culture where producers are allowed to grow the shrimp that are trapped in ponds after having entered into the culture area with natural water flows.

In the future, it is likely that the use of certified broodstock fisheries as the source will be required. Defining the sustainability of wild fisheries is very challenging and there is a strong need to certify the source to ensure that the standards are sufficiently robust. The ShAD Standards recognize the challenges for the auditing of this standard, as not all countries will have fisheries management plans. However, the ShAD Standards view this as an opportunity to create incentives for producers to ensure the strong management of the fisheries they use for broodstock.

Guidance for implementation

The GSC recognizes that auditing these standards is 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 also demonstrate that they have a working knowledge of the guidelines and are in compliance.

6.2.2: Continuous improvement must be demonstrated with the goal of 100% within six years of the date of the ShAD Standards publication.

6.2.3: "Locally" is defined as fished along the same coasts of the same country where the farm is located.

6.2.4: Farms must be able to demonstrate the source of their postlarvae. The ShAD Standards are willing to make an exception for natural influx systems provided they are compliant with all other aspects of the standard.

Criterion 6.3: Transgenic shrimp[116]

	Indicator	Standards
6.3.1	Allowance for the culture of transgenic shrimp (including the offspring of genetically engineered shrimp).	None.

6.3 Rationale

The culture of transgenic shrimp is prohibited by the ShAD Standards. The ShAD Standards recognize that

[115] **Domestication:** Altering the behaviors, size and genetics of animals and plants. (http://archaeology.about.com/od/domestications/Domestications_of_Animals_and_Plants.htm)

[116] **Transgenic Shrimp:** a subset of GMOs, are organisms which have inserted DNA that originated in a different species. Some GMOs contain no DNA from other species and are therefore not transgenic but cisgenic.

there is a difference between transgenic and genetically enhanced[117] shrimp and is only concerned about transgenic shrimp at this time.

With the current high frequency of farmed shrimp escapes, the ShAD Standards are concerned about the uncertainty surrounding the potential impacts of escaped transgenic shrimp breeding with wild shrimp, and the potential for transgenic shrimp to establish feral populations in the wild environment. Invoking the precautionary principle, the ShAD Standards 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 shrimp are banned forever, but there is no justification for their use at this time, and that precautions to be taken when rearing those transgenic shrimp are still to be defined for them to be environmentally and socially responsible.

[117] **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.

Principle 7: Use resources in an environmentally efficient and responsible manner

Impact: The culture of shrimp often requires the intensive use of resources. The use of wild-caught (e.g., pelagic fish) and terrestrially farmed ingredients (e.g., soy) in shrimp feeds has a potentially negative impact on marine and terrestrial ecosystems. Energy use also requires specific attention. This principle not only addresses the origin of those 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	Standards
7.1.1	Evidence of basic traceability of feed ingredients, including source, species, country of origin and harvest method demonstrated by the feed producer.[118]	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 65 compliant certification scheme that also incorporates the FAO[119] Code of Conduct for Responsible Fisheries.	Yes.

7.1 Rationale

The GSC recognizes that these standards could be improved with ASC feed-specific standards, and until they are developed, the GSC believes that interim standards are necessary to address certain impacts. The GSC recognizes the auditing challenges associated with these standards and will be working with the ASC to develop effective auditing mechanisms while simultaneously encouraging them to develop feed standards. The GSC will also ensure that farmers will not be penalized 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 mislabeling or fraudulent labeling 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

[118] Traceability must be at a level of detail that permits the feed producer to demonstrate compliance with the standards in this document. Compliance would be in the form of third-party documentation of quality assurance schemes and traceability of ingredients. This standard also assumes that the feed producer will make available to the farm a full list of feed ingredients and is aware that the relevant portion of the auditor report may be disclosed to purchasing retailers although the ingredient sources may be not revealed

[119] Food and Agricultural Organization of the United Nations (FAO)

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)[120] 65-compliant certification scheme that also incorporates the FAO Code of Conduct for Responsible Fisheries.

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. Auditing guidance will be developed that accounts for fluctuations in the percentage of ingredients over time.

7.1.2: Requires the demonstration of chain of custody and traceability for fisheries products in feed through an ISEAL-accredited or International Organization for Standardization (ISO)[121] 65-compliant certification scheme that also incorporates the FAO Code of Conduct for Responsible Fisheries.

Criterion 7.2 - Origin of aquatic and terrestrial feed ingredients

	Indicator	Standards
7.2.1a	Timeframe for 100% (mass balance) fishmeal and fish oil used in feed to come from fisheries[122] certified by a full ISEAL member[123] that has guidelines specifically promoting ecological sustainability of forage fisheries.	Within five years following the date of standards publication.
OR for the interim		
7.2.1b*	FishSource score[124] [125], for the fishery(ies) from which a minimum of 80% of the fishmeal and fish oil by volume	a. 8 b. 6 or compliance with alternative

[120] http://www.iso.org/

[121] http://www.iso.org /

[122] This standard applies to fishmeal and oil from forage fisheries and not to by-products or trimmings used in feed

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

[124] http://www.fishsource.org/

[125] Or equivalent score using the same methodology

	is derived (See Appendix III, subsection 3 for explanation of FishSource scoring)a. for Fishsource Criteria 4 (spawning biomass assessment) b. for Fishsource Criteria 1, 2, 3 and 5	interim proposal b.
7.2.2	Percentage of non-marine ingredients from sources certified by an ISEAL member's certification scheme that addresses environmental and social sustainability.	80% for soy and palm oil within five years from the date of the ShAD Standards publication.

7.2 Rationale

Currently, more than 75% of the world's fisheries are at or over capacity.[126] 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.

To ensure that fisheries that are clearly unmanaged or mismanaged are not a major source of feeds, 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 8 on FishSource 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 The GSC recognizes the challenges that this may create for Southeast Asian farmers whose fisheries may not have a FishSource score. The Sustainable Fisheries Partnership is working on populating FishSource with regional fisheries in Asia as soon as possible to accommodate this demand.

The GSC recognizes that to some this standard may be insufficient, as it does not fully address the impact of removing forage fish[127] in large quantities from the base of the marine food chain. This standard will need to evolve as new knowledge emerges.

The ShAD Standards support the use of human food-filleting waste from environmentally preferable fisheries or aquaculture facilities. The International Fishmeal and Fish Oil Organization (IFFO)[128] reports that 25% of fishmeal currently being used for aquaculture is coming from fish processing by-products

[126] **THE STATE OF WORLD FISHERIES AND AQUACULTURE 2006-FAO**

[127] Forage fisheries serve multiple purposes, including being both ingredients for aquafeeds as well as direct food items for humans. Forage fisheries are a sustainable source of food for direct human consumption due to their biology (e.g. rapid life cycles, early age at maturity, highly fecund, etc.) and that they can be harvested by low impact gears. Forage fisheries are also particularly important in developing countries as they offer a primary source of EPA/DHA, which is necessary for human development. Inefficient conversion of wild fish, used for subsistence, into farmed fish, used for discretionary consumption, represents a meaningful issue of equity and food security. Assuring continually more efficient conversion of wild fish to farmed seafood is one way that the aquaculture industry can affirm its commitment to global food security.

[128] http://www.iffo.net/default.asp?fname=1&sWebIdiomas=1&url=368

and this amount is expected to increase. While the ShAD Standards encourage the use of by-products, it recognizes that this can result in higher feed conversion ratios (FCRs), which results in tradeoffs between effluent concentration and efficient use of marine resources. The ShAD Standards have attempted to address this tradeoff by requesting reporting the FCR (see Criterion 7.4).

As the production of terrestrial feed ingredients can have significant environmental and social impacts[129], the Standards avoid replacing unsustainable marine feed ingredients with equally damaging or unsustainable non-marine alternatives.

Eventually, all ingredients of non-marine origin (e.g., terrestrial proteins and oils) will need to be certified using standards that are developed by a multi-stakeholder process conforming to ISEAL guidelines for standard setting (www.isealalliance.org). Currently, there are such standards for palm oil[130] and soy[131], and thus 80% of these two ingredients must come from ISEAL's member certification systems.

Guidance for implementation

7.2.1a: ISEAL is a global association for social and environmental standards systems. More information can be found at http://www.isealalliance.org . These standards strive to meet the ISEAL guidelines for standard setting. Fisheries ingredients must be certified by a process that conforms to the ISEAL guidelines within five years of the publication date of the ShAD Standards. 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 of its customers making a similar request. These ingredients would get mixed into the general silos and production lines of the manufacturer, greatly reducing costs associated with special storage capacity and production lines. This could be done instead of requiring documentation for a single batch per farm. 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.

7.2.1b: Fishery status information may be accessed through FishSource www.fishsource.org/indices_overview.pdf) and the IFFO Responsible Fisheries www.iffo.net/default.asp?fname=1&sWebIdiomas=1&url=368) .

Alternative interim proposal

Outline of the Improvers Program (IP)

An applicant for adoption into the IP must be a named factory producing fishmeal and fish oil.

The factory shall produce two key documents to be accepted formally onto the IP:

A Gap Analysis Study identifying where the factory and its raw material fail to meet the MSC standard.

An Action Plan which identifies how any shortcomings will be addressed, who is responsible for their completion and in what timescale.

Both these documents shall address the two areas which comprise the Responsible Sourcing standard: responsible raw material procurement and responsible production. The steps required to

[129] e.g. the conversion of important biodiversity areas (e.g. the Amazon rainforest) for ingredients used in aquaculture production (e.g. soy) and the use of pesticides and other chemicals in intensive agriculture

[130] http://www.rspo.org/

[131] http://www.responsiblesoy.org/, http://wwf.panda.org/?16872/The-Basel-Criteria-for-Responsible-Soy-Production

be undertaken for a non-compliant factory wishing to be part of the IP are as follows (see also the diagram below):

Phase 1 - Initial assessment

The applicant shall ask their source fishery/fisheries to formally contract an MSC accredited CAB (this could be also done by independent consultants) to be considered for the MSC pre-assessment.

If the applicant has already applied for but failed to achieve the MSC standard, then the existing audit report can be used to determine the required improvements (Gap Analysis Study).
If the applicant has not applied to MSC but is sure that the required standard cannot yet be met, then the applicant shall commission a third-party preliminary evaluation of the source fishery and its existing systems against the MSC Standard (IFFO to assist and advise).

This Gap Analysis Study shall identify any deficiencies and improvements required to both factory and incoming raw material. Based on this study, IFFO shall advise the applicant on suitability of the factory for adoption onto the IP. If both parties agree that a workable Action Plan can be structured, the applicant moves to Phase 2 and becomes an eligible supplier to ASC feeds.

Phase 2 – Formulation and implementation of an Action Plan

If the Gap Analysis Study identifies issues with the management of the fisheries providing the raw material to the factory, a Stakeholder Committee shall be formed.

The partnering consultant shall assist the applicant in the formation of the Stakeholder Committee.

The Stakeholder Committee shall have the task of producing a Fisheries Improvement Program.

It is envisaged that the Stakeholder Committee would have representatives from some or all of the following:

The applicant

IFFO Relevant (or partnering) eNGOs

Local fishing industry

Relevant fisheries management agencies (both administrative and scientific)

Science advisors

Sustainable Fisheries Partnership

FAO or similar agency (for example, a regional body)

Funding agencies, if applicable

Local Environmental groups, as appropriate

The Stakeholder Committee shall produce a Fisheries Improvement Program with clear targets, milestones, costs and funding source(s). If the Gap Analysis Study identifies issues with the management of the factory, the fishery, the applicant and the IFFO shall produce a Factory Improvement Program that has clear targets, milestones, cost and funding source. The Factory and Fishery Improvement Program together shall form the applicant's Action Plan.

The duration of this plan would be dependent on the complexity of the work required to be undertaken either with the factory or ,more likely, with the fishery. However, it is expected that they would normally be 3-6 years with a maximum of 10 years. The applicant and the Stakeholder

Committee shall agree that the plan is achievable and that every effort will be made to complete it.

IFFO and the consulting party shall then issue a formal notification via the ASC website that the factory has been adopted onto the IP and can therefore refer publicly to its participation in the Program. However, it should be noted that no certification to the factory will be been given at this stage. An independent MSC-accredited Certification Body (appointed through an agreement between IFFO and the applicant) shall then be appointed to ensure that the milestones in the Action Plan are being met and reports on progress are provided to the IFFO-partnering consultant and the Technical Advisory Committee.

Serious failure (> 1 year inability to meet a timeline based on feasible expectations as defined by at least two technically competent experts with no vested interest in either the fishery, mill or end product) to adhere to the Action Plan shall result in the removal of the factory from the Improvers Program. In the event of dispute, the Technical Advisory Committee to the RS standard ASC TAG shall act as an appeals body.

Phase 3 – Certification of factory to IFFO RS the fishery to MSC

Assuming completion of the Action Plan, the factory can then apply for the RS standard MSC full assessment. An independent MSC-accredited Certification Body shall then audit the factory fishery against the RS MSC standard. Assuming completion of the Action Plan, it is anticipated that all the requirements for the RS standard MSC standard will have been met, and a successful outcome from the audit would be expected. If desired, an approved fishery might then seek to become certified under the MSC standard for sustainable fisheries. IFFO ASC shall publish on its website a list of all factories that are currently in the Feed Fisheries Improvers Program with dates of the expected completion of their Action Plans.

7.2.2: Compliant sources for soy could include the Sustainable Agriculture Network (SAN) protocol for soy and/or the Roundtable for Responsible Soy Production (RTRS) or other ISEAL member-compliant schemes.

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

Value Statement:
The GSC recognizes the complexity of the GM issue and there was significant debate in the GSC 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 ShAD Standards require 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. The GSC 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. The GSC releases these standards under the condition that this process is initiated within a year by the ASC.

	Indicator	*Standards*
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: a. Disclosure on the audit reports if GMO ingredients were used in the feed fed to shrimp b. 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 are 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.	Yes.[132]

OR

For farmers using GM-free feed:

7.3.2	List (footnote) of feed ingredients does not contain any GMO.	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.

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

7.3 Rationale

The allowance for GM[133] feed ingredients versus their exclusion was a very challenging issue for the ShAD. The GSC identified the following as a problem statement:

[132] Certified organic or GMO-Free by an accredited certifier

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?

Overall, there is agreement on the GSC that the ShAD Standards are working toward a goal where there are no significant environmental and social impacts associated with the use of GM feed ingredients, as these circumstances define acceptable GM ingredients in shrimp feed. Furthermore, there is agreement that a complete ban of GM ingredients is not appropriate at this time nor is the allowance of GM ingredients without form of transparency. There is further acknowledgement that this issue needs to be addressed by a Feed Aquaculture Dialogue and the ShAD GSC urges the ASC to undertake this initiative as soon as possible.

The core GSC 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/ShAD Standards aspire to promote a world where there are no significant social and environmental impacts of GM feed ingredients, the ShAD Standards must 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. Some of the documented impacts of GM crop production on ecosystems, human and animal welfare, and social justice are presented and discussed in the ShAD Standards GM White Paper[134]. The ShAD Standards are 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 hybridization, 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 (see white paper). For these reasons, the ShAD Standards will continue to move towards precautionary[135] preclusion of open-grown GM-plant ingredients until there is strong evidence that such risks can be reliably mitigated or do not exist.

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[133] 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.

[134] See Appendix V available at: www.worldwildlife.org/shrimpdialogue

[135] Defined As: when an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically (takingprecaution.org)

The current ShAD Standards mandate 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 plants, 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 GSC 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 ShAD Standards mandate 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. It is important to note that this proposal was not unanimously supported by the ShAD GSC but was enough supported to fulfill the official definition of consensus for the process (support from at least 75% of the committee and at least 2/3 of members from both industry and NGO sectors).

The ASC should clearly post a value statement on their website with regard to the use of GMO feed ingredients and their commitment to transparency. Though it is clear that ASC's statement be in alignment with all other participating Aquaculture Dialogues; the ShAD GSC would like to see alignment with its goal of working towards no significant environmental and social impacts associated with the use of GM feed ingredients, as these circumstances define acceptable GM ingredients in feed. The GSC believes that this is necessary to bring credibility to this compromise position. The ASC's Technical Advisory Group should review the standards within five years and assess the availability, utilization cost difference, market penetration and the credibility risk for GM ingredients and update the standards accordingly.

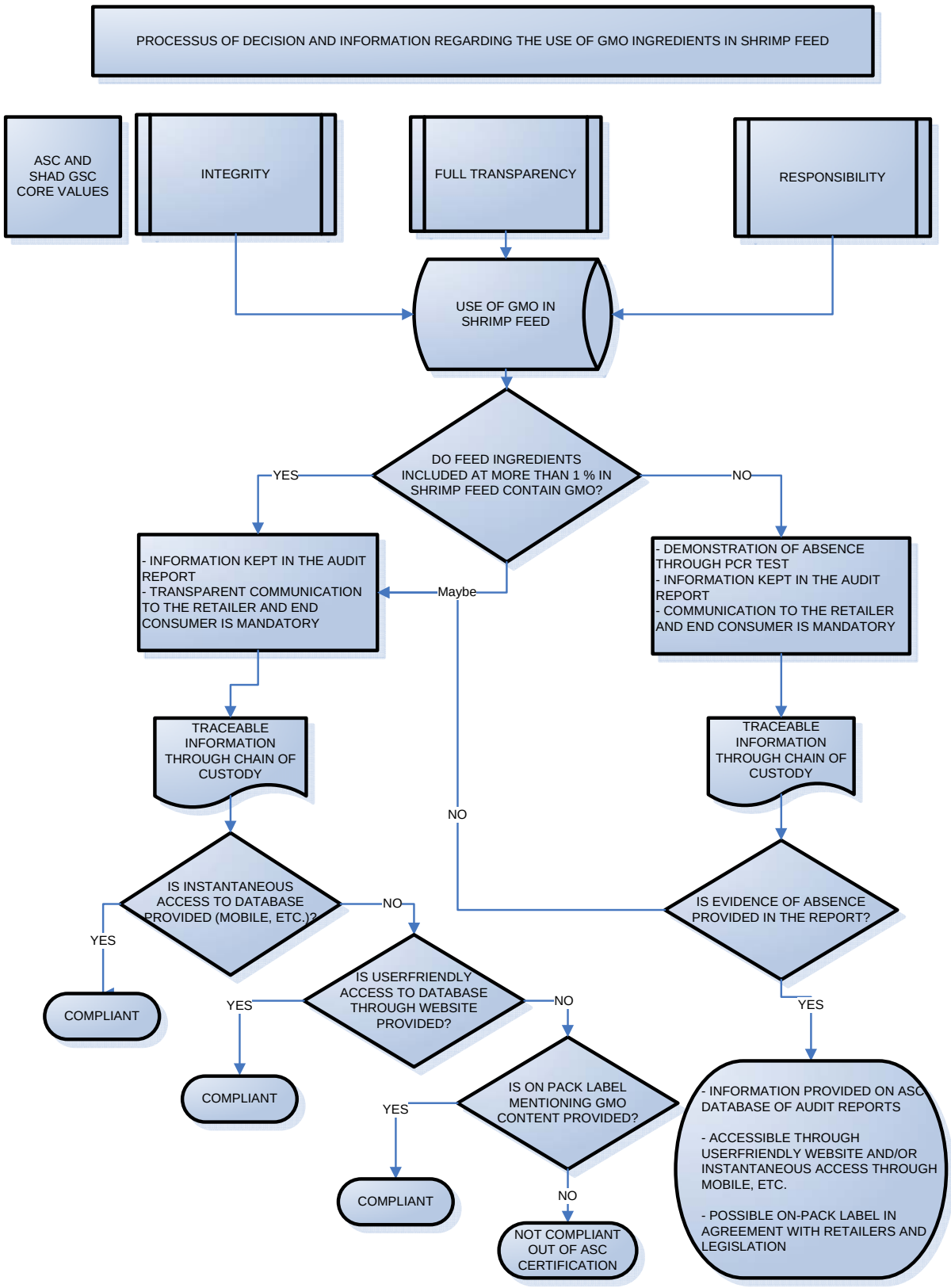
Allowance for on-package labeling of positive statements such as “fed with GMO-free ingredients” is possible when allowed by legislation and the retailer and if the audit report demonstrates its compliance (NOTE: this co-labeling is not associated with the ASC label but can be separate on a package label). The GSC believes that this requirement needs to be mentioned in the standards for two reasons: one is to make publicly clear that a positive statement regarding non-GMO feeds is authorized for ASC-certified products respecting ShAD standards 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

Evidences of the presence or absence of GM ingredients in feeds must be collected by the auditor. Evidences 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 evidences 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 evidences need to be communicated through the chain of custody according to the decision tree below.


PROCESSUS OF DECISION AND INFORMATION REGARDING THE USE OF GMO INGREDIENTS IN SHRIMP FEED
ASC AND SHAD GSC CORE VALUES
INTEGRITY
FULL TRANSPARENCY
RESPONSIBILITY
USE OF GMO IN SHRIMP FEED
DO FEED INGREDIENTS INCLUDED AT MORE THAN 1 % IN SHRIMP FEED CONTAIN GMO?
YES
NO
Maybe
- INFORMATION KEPT IN THE AUDIT REPORT
- TRANSPARENT COMMUNICATION TO THE RETAILER AND END CONSUMER IS MANDATORY
- DEMONSTRATION OF ABSENCE THROUGH PCR TEST
- INFORMATION KEPT IN THE AUDIT REPORT
- COMMUNICATION TO THE RETAILER AND END CONSUMER IS MANDATORY
TRACEABLE INFORMATION THROUGH CHAIN OF CUSTODY
TRACEABLE INFORMATION THROUGH CHAIN OF CUSTODY
NO
IS INSTANTANEOUS ACCESS TO DATABASE PROVIDED (MOBILE, ETC.)?
IS EVIDENCE OF ABSENCE PROVIDED IN THE REPORT?
YES
NO
YES
COMPLIANT
IS USERFRIENDLY ACCESS TO DATABASE THROUGH WEBSITE PROVIDED?
YES
NO
COMPLIANT
IS ON PACK LABEL MENTIONING GMO CONTENT PROVIDED?
YES
NO
COMPLIANT
NOT COMPLIANT OUT OF ASC CERTIFICATION
- INFORMATION PROVIDED ON ASC DATABASE OF AUDIT REPORTS
- ACCESSIBLE THROUGH USERFRIENDLY WEBSITE AND/OR INSTANTANEOUS ACCESS THROUGH MOBILE, ETC.
- POSSIBLE ON-PACK LABEL IN AGREEMENT WITH RETAILERS AND LEGISLATION

Criterion 7.4: Efficient use of wild fish[136] for fishmeal and oil

	Indicator	Standards
7.4.1	Feed Fish Equivalence Ratio (FFER)[137] *L. vannamei P. monodon*	L. vannamei 1.35:1 P. monodon 1.9: 1
7.4.2a	Economic Feed Conversation Ratio (eFCR)	Records are available
	AND	
7.4.2b	Protein Retention Efficiency	Records are available

7.4 Rationale

In theory, the use of only sustainable fisheries ingredients should assure the ongoing supply of wild fish inputs for aquaculture. However, at least two other considerations suggest that it will be both precautionary and socially responsible to minimize the use of wild fish in feed. Furthermore, minimizing wild fish in feeds is consistent with market trends, as the aquafeed industry has already made significant strides to reduce wild fishmeal and fish oil inclusion rates. Increasing demand on finite global forage fisheries suggests that the trend to find efficient (economically and metabolically) alternatives to wild fish as crude protein in shrimp feeds will continue.

The ShAD Standards mandate an FFER 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 likely grow in importance as global resources become more limited. 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 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 ShAD Standards mandate that *L. vannamei* have an FFER equal to 1.35 and that *P. monodon* have an FFER equal to 1.9. These performance levels represent a good initial baseline for this standard respecting the differences in the two species of shrimp. This difference is based on different nutritional requirements between the two species of shrimp and may be harmonized over time.

The eFCR (7.4.2a) standard is included to help guard against wasteful feeding rates that could still achieve FFER 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 would align incentives around the following: accurate tracking of shrimp weight/biomass, good feed management to keep feed fresh and assure no waste prior to use, careful tracking of parameters to optimize feed uptake by shrimp

[136] Fisheries byproducts that meet the sustainability and traceability criteria in 7.1 and 7.2 do not count in the following wild fish for fishmeal and oil calculations and can therefore be used to assist producers with achieving compliance.

[137] Feed Fish Equivalency Ratio (FFER): the quantity of wild fish used per quantity of cultured fish produced (x:x).

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 shrimp harvested and climate conditions under different latitudes, and the GSC has decided to not set a threshold eFCR in this first version of ShAD Standards. Data collected from audited farms will be used for setting standards in the next version.

7.4.2b Protein Retention Efficiency (PRE) is a measure of the net protein loss in the aquaculture system and, unlike FFER, 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 shrimp conversions and which varies greatly with shrimp 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. As this is a relatively undocumented parameter in the field, the GSC has preferred not to set a standard at this stage. The GSC views this as starting point on a critical issue and expects to be able to set a standard as information is collected and if it proves to be a useful indicator of responsible shrimp production.

Guidance for implementation

7.4.1: In the case of shrimp, fish meal will be the determining factor for the FFER, as fish oil use in shrimp feed is very low. The ShAD Standards FFER standard of 1.35 for *P. vannamei* is based on a shrimp farmer with an eFCR of 1.5 using a feed with a fishmeal inclusion rate of 20% (and for *P. monodon*, a FFER of 1.9 allows for 23.4% fishmeal for an eFCR of 1.8). 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.

$FFER_m$ = (%fishmeal in feed x eFCR) / 22.2

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

% fishmeal in feed = [(%fishmeal Feed A x quantity Feed A used) + (%fishmeal Feed B x quantity Feed B used) + …] / [Total quantity of Feeds A, B+,…]

7.4.2a: The eFCR is calculated for all harvests over the last 12-month period.
eFCR = Feed, Kg or MT / Net aqua cultural 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: PRE is a measure of the amount of protein provided in the feed that is retained in the harvested shrimp 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%). The GSC will collect data towards a standard that best reflects responsible aquaculture for future standards revisions.

Protein Retention **Efficiency (PRE) = [% protein in harvested shrimp / (eFCR x % protein in feed)] x 100%**

In case several feed formulations are used, a weighted average protein content need 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	Standards
7.5.1	Nitrogen effluent load per ton of shrimp produced over a 12-month period. [138]	Less than 25.2 kg N per ton of shrimp for *L. vannamei.* Less than 32.4 kg N per ton of shrimp for *P. monodon.*
7.5.2	Phosphorous effluent load per ton of shrimp produced over a 12-month period.	Less than 3.9 kg P per ton of shrimp for *L. vannamei*. Less than 5.4 kg P per ton of shrimp for *P. monodon.*
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[139], and concentration of settleable solids in effluent water < 3.3 mL/L.[140]
7.5.5	Percentage change in diurnal dissolved oxygen (DO) relative to DO at saturation in receiving water body[141] for the water's specific salinity and temperature.	≤ 65%

7.5 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 shrimp 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 wastewater national 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). Scientific

[138] Farms are required to determine the annual nitrogen and phosphorous effluent loads using one of the methods described in Appendix 3

[139] Settling basins need to comply with characteristics given in Appendix 3.

[140] The settleable solids concentration at the outlet of the effluent treatment system must be measured at 4-hr intervals when shrimp ponds are being drained or whenever treated water is discharged. Settleable solids are measured as the volume of solids that settles to the bottom of a conical cone (Imhoff cone) in 1 hour

[141] measured at a station at least 200 m down current from the farm outfall

studies show that N or P load is not much related to the level of culture intensity and feeding, and that for a typical culture in earthen ponds operated at 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. Assuming a typical composition of feeds and a FCR of an efficient operation (Table 1), these ratios can be used for setting standards.

Table 1. Assumptions used for determining standard nitrogen (N) and phosphorous (P) inputs

	Feed composition			FCR
	Protein content (%)	N content (%)	P content (%)	
L. vannamei	35	5.6	1.3	1.5:1
P. monodon	38	6.1	1.5	1.8:1

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 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

Shrimp 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, which allows the water level to fall as water flows 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 center of ponds. When ponds are drained, the recently accumulated wastes are relatively fluid and tend to be lost in outflowing water (Boyd 1995; Boyd and 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. These are the reasons the ShAD Standards require wastewater treatment for intensive ponds but not for semi-intensive and extensive ponds.

A settling basin can improve the quality of effluents 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 and Queiroz 2001; Ozbay and Boyd 2004). About 100% of SS, 90% of TSS, 60% of 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). There is probably little benefit to increasing HRT beyond six hours for removal of solids;

however, a greater retention time might enhance water quality. Moreover, the settling basin should have a volume of at least 1.5 times larger than the minimum six-hour HRT volume to have the sediment storage capacity necessary to maintain the six-hour HRT overtime.

The use of settleable solids (SS) rather than total sedimentable solids (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. SS are the environmentally harmful fraction of the TSS, as most of the turbidity and sediment results from SS, and a lot of organic matter and phosphorus are associated with the solids (Boyd 1978). Removal of SS from water will lessen the biological oxygen demand (BOD) and total phosphorus concentration. The determination of settleable solids is a simple analysis and is inexpensive to conduct. A limit of 3.3 milliliters per liter of settleable solids was defined for discharge permits in the United States after the first USEPA study of aquaculture facilities in the mid-1970s (USEPA 1974).

Effect on receiving water bodies The ShAD Standards address the cumulative impact of shrimp 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 ShAD Standards chose the diurnal dissolved oxygen 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 dissolved oxygen. 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 nighttime-dissolved oxygen levels is of critical importance to aquaculture operations to maintain fish health and productivity.

Guidance for implementation

7.5.1 and 7.5.2: N and P contents of inorganic fertilizers are indicated on the bags. In case of organic fertilizers, N and P contents need to be provided by the manufacturer. N content of feeds can be calculated from the declared protein content using the following formula:
N content (%) = Protein content (%) / 6.25
P 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 meters high and twice as large as the area needed for the volume of sediment to be stored so that at least half (0.375 meters) 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 a practice that the ShAD Standards would encourage. 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 meters 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). DO 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%.

Shrimp 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 located 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 meters into estuarine water bodies (Boyd personal communication). Of course, the mixing zone could be roughly delineated by a relatively simple procedure. Shrimp farm effluents are seldom of the same turbidity as receiving waters. Thus, Secchi disk visibility measurements could be made at 25-meter 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 meters 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	Standards
7.6.1	Energy consumption[142] by sources[143] over a 12-month period.	Records available for all activities.

[142] Only activities carried out on the farm site are considered. Transport of personnel, materials and shrimp to and from farm site are not considered. For clarity, farms must list activities included in the records of energy consumption, including: water aeration, water pumping, offices, internal transportation, etc.

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

7.6.2	Annual Cumulative Energy Demand (megajoules/ton of shrimp produced)[144] over a 12-month period.	Records available for verification of calculations.

7.6 Rationale

Energy is consumed throughout the culturing, harvesting, processing and transportation stages of shrimp production. There are also many other energy drains to consider, such as energy consumed during the construction of facilities, during maintenance and updating of facilities, during the production of those construction materials, and during the production of liming materials, fertilizers and other inputs. The ShAD Standards acknowledge that, at this time, there is insufficient data available for setting energy use standards. Therefore, the ShAD Standards require the collection of energy consumption data by audited farms to be able to set up energy standards in the future. To be useful for addressing the issue of carbon emissions in the future, data collection needs to be as detailed as possible so that the conversion of energy consumption to carbon emission will be feasible.

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 shrimp to and from the farm site and transport of personnel to and from farm site are not included. For clarity, farms must list activities included in the records of energy consumption, including: water aeration, water pumping, offices, internal transportation, etc.

7.6.2: For calculating the annual CED, quantities of different energies cumulated over 12 months and expressed in different units must all be converted to megajoules. Refer to the tool available at: http://www.eia.doe.gov/energyexplained/index.cfm?page=about_energy_conversion_calculator. The total amount from the different energy sources expressed in megajoules is then divided by the farm production over the same 12-month period.

Criterion 7.7: Handling and disposal of hazardous materials and wastes

	Indicators	Standards
7.7.1	Safe storage and handling of chemicals and hazardous materials.[145]	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.

7.7 Rationale

The construction and operation of shrimp farms often involve the use of hazardous chemicals (e.g., combustibles, lubricants and fertilizers) and the generation of wastes, some of which are classified as

[144] For calculating the annual CED, quantities of different energies cumulated over 12 months and expressed in different units must all be converted to megajoules. The total amount from the different energy sources expressed in megajoules is then divided by the farm production in tonnes of head-on shrimp over the same 12-month period.

[145] 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 any 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 authorized personnel.

hazardous. The storage, handling and disposal of such hazardous materials and wastes must be done responsibly, according to the relevant legislation and their respective potential impacts on the environment and human health. Farms must implement management plans for the storage, handling and disposal of hazardous materials and wastes based on the potential risks that they present and the location of their 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), in the best possible way depending on local facilities. When appropriate facilities for waste disposal are absent in the area, shrimp farms are allowed to burry non-hazardous solid wastes on site, provided all precautions have been taken to prevent the contamination of surrounding surface and ground waters. Non-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 ShAD Standards appreciate that shrimp farms are generally located in areas where accredited waste management companies are not necessarily established or accessible. Farmers must demonstrate the use of the most responsible disposal solutions based on what is locally available. Where hazardous biological wastes exists, including shrimp 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 shall be 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 is intended to explain what is meant by "biodiversity-inclusive" Environmental Impact Assessment (B-EIA), the different types of B-EIA that can be implemented, the benefits of B-EIA to farmers, to clarify the role of B-EIA in farm planning and management, and to outline the basics required 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 IAIA (1999) define an Environmental Impact Assessment as: "The process of identifying, predicting, evaluating and mitigating the biophysical, social and other relevant effects of development proposals prior to major decisions being taken and commitments made." (International Association for Impact Assessment, http://www.iaia.org).

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 and how and by whom any actions needed to deliver biodiversity objectives will be implemented and monitored. 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 also seeks to add value to other ShAD Standards and contribute to demonstrating compliance, while taking into account specific local landscape conditions.

B-EIA assessment team
The BEIA 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 and 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 ShAD Standards.

B-EIA Statement
The B-EIA Outline in Appendix 1 follows best practices as outlined by the IAIA and the Institute for Environmental Assessment[146], The Espoo Convention, signed in 1991, which lays down the minimum content of an EIA in its Appendix II[147] and the Convention on Biodiversity, which has outlined the main content and process for B-EIAs[148]. The BEIA should be consistent with the criteria outlined in other

[146] http://www.iaia.org/publicdocuments/special-publications/Principles%20of%20IA_web.pdf
[147] http://www.unece.org/env/eia/documents/legaltexts/conventiontextenglish.pdf
[148] Guidelines on BEIA: http://www.cbd.int/doc/reviews/impact/EIA-guidelines.pdf

related ShAD Standards and carried out in conjunction with the Social Impact Assessment outlined in Standard 3.1.

The BEIA 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 BEIA 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 BEIA 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 organize such a stakeholder meeting and validate his/her findings with the community stakeholders asking questions such as: Did I capture it all? Can you comment on my findings?

The product of a 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 to be used

Screening - to determine whether or not 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 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 BEIA.

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 minimize negative impacts on it.

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

The type of farming used, 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.
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 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, making reference 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 IS – 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 features 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.

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 testaments that the current farm did not cause mangrove deforestation or natural wetland alteration as per Standard 2.2.2. A B-EIA must identify critical habitats for all species at risk on the proposed site and design constructions that protect these areas. The first requirement is that farmers are aware of the different species on their farm. Big farms 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 both through national agency records and direct monitoring the organisms present on farms including the largest organisms known to have occurred within 10 years and 50 km of a farm. Corridors shall be designed to allow free passage of such organisms. The B-EIA will allow the farmer to demonstrate compliance. The BEIA must also address Standards 2.4.1.

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 coherent with the required outcomes of the BEIA.

Mitigation and offsetting – The BEIA 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. Avoid "excuse"-type compensation[149]. 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 statement and related management documents. The B-EIA must be made available to all stakeholders and any interested party for review. Any comments put forward by either party must be taken into consideration prior to finalizing mitigation and compensation measures to be implemented. A peer review of environmental reports with regard to 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 is made possible 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 case, 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. Provision shall be made for emergency response measures and/or contingency plans where upset or accident conditions could threaten biodiversity. Farms shall monitor neighboring mangrove areas to ensure that negative impacts are not occurring. Factors to consider in mangrove assessments include changes in the 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.[150]

Applying B-EIA on existing, expanding and new farms

It does not matter whether a B-EIA is done around an existing farm, an expanding farm or a newly planned farm establishment. The methodology remains the same, and the recognition of dependencies and impacts (positive and negative) remains the same.

[149] Needs definition
[150] Boyd, 2002

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 both cases, the outcome is oriented towards identifying how to responsibly address these risks and impacts in accordance with the standards 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 (more than 15 ponds or 25 hectares in total production area) will need professional expertise to undertake a B-EIA, largely due to the size of area and number of operations, 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 (six to 15 ponds but no larger than 25 hectares in total area) or individual small farms (maximum five ponds and five hectares) may be able to do a credible B-EIA through the consultancy services of an academic ecologist or a conservation civil society organization in or familiar with the area and its ecosystem. One such person may be able to plan, implement and report on 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 BEIA 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 with regard to 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**
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: A small-scale farm is	B-EIA done by an academic ecologist /NGO consultant using guidance framework and methodology.

defined as having a maximum of five ponds but the total production area is no larger than five hectares.A medium-scale farm is defined as six to 15 ponds but having a total production area no larger than 25 hectares.	
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.A large-scale farm is defined as having more than 15 ponds or having more than 25 hectares of total production area.	B-EIA done by an accredited professional expert and based on guidance framework.

Auditing a B-EIA

In auditing for this criterion, auditors need to look for the (apparent) completeness of a B-EIA report and verify the manner in which 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 look at the 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 does it list dates of meetings and names of participants; in addition, a cross-check should be performed with (some of the) participants to find out if the same 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?).

Check for completeness of B-EIA report

Contents as listed above

B-EIA announcement, draft, final report and summary are locally disseminated and distributed according to the above checklist

Cross-check with local government, by stakeholders' chosen organization, at random with 2-3 stakeholders listed as participants in meetings *(random checks increase if doubts appear)*

Was/is information on B-EIA process and on B-EIA contents available to them?

Were their suggestions (i.e., impacts, solutions) reflected in the report?

To determine compliance with this particular 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 and in preparation of the final B-EIA report, meetings with the listed stakeholders (or by stakeholders chosen representatives) have taken place.		
(d) These meetings have been recorded and the minutes are attached to the final report; names and contact details of participating stakeholders included.		
(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.		
(g) B-EIA completed according to guidance on B-EIA and pSIA relationship (transparency and consultation).		
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:		
(a) The type of farming, possible alternatives and a summary of activities likely to affect biodiversity.		
(b) An analysis of opportunities and constraints for biodiversity (include “no net biodiversity loss” or “biodiversity restoration” alternatives).		
(c) Expected biophysical changes (in soil, water, air, flora and fauna) resulting from proposed or existing activities or induced by any socioeconomic changes.		
(d) Spatial and temporal scale of influence, identifying effects on connectivity between ecosystems, and potential cumulative effects.		
(e) Available information on baseline conditions and any anticipated trends in biodiversity in the absence of the proposal.		

(f) Likely biodiversity impacts associated with the proposal or current operations in terms of composition, structure and function of surrounding ecosystems.		
(g) Biodiversity services and values identified in consultation with stakeholders and anticipated 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, making reference 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 of 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 and clear understanding of how affected groups were involved and how balanced consideration was given to conservation vs. development goals in the peer review.		
7. Clear articulation of a biodiversity management system including targets and monitoring strategies for mitigation.		

For further background information on B-EIA processes:
BIODIVERSITY IN IMPACT ASSESSMENT (IAIA, 2005)

GUIDELINES FOR ECOLOGICAL IMPACT ASSESSMENT (Institute of Ecology and Environmental Management, IEEM, 2006)

FAO Fisheries and Aquaculture Technical Paper 527 Environmental impact assessment and monitoring in aquaculture – Requirements, practices, effectiveness and improvements (Aquaculture Management and Conservation Service, Fisheries and Aquaculture Management Division,
FAO Fisheries and Aquaculture Department)

Appendix II : 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. (International Association for Impact Assessment, www.iaia.org*)*

A p-SIA can be undertaken in different contexts and for different purposes. The way a p-SIA is performed on behalf of a big multinational corporation as part of that company's planning and development may be very different to 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. Each of these applications of p-SIA is worthwhile and the choice may depend on the size of the (actual or intended) farm.

The improvement of 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 different groups in society and the impact burden experienced by vulnerable groups in the community should always be of primary concern.

The role of p-SIA will be to ensure that:
(1) the views of all stakeholder groups have been 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 redesigned as much as possible to reduce these consequences and mitigation or compensatory mechanisms have been developed.

If done correctly, the effect of a p-SIA will be mutually beneficial:
Maximized positive and minimized negative impacts to the "surrounding" community and their social wellbeing and livelihoods.
Reduced costs and risks to the farm operation due to increased comfort with and absence of conflict with the "surrounding" community.

The essence of all properly implemented p-SIAs is that they are sequentially repetitive (i.e., fine-tuned and adapted in a sequence of steps) and participatory (i.e., stakeholders are given the opportunity and invited to influence process and contents of discussions). Specific designs in methodology 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, they need to be developed in conjunction with the 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 sketch-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) Seek out these people or seek advice as to the identification of appropriate representatives of these people. Consider that women and children are often specific groups within a community with specific needs and interests.
(5) Double-check this by disseminating 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 this.

<u>Ways to classify stakeholder groups include:</u>
Primary stakeholders: those 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 and dykes), interruption of social or socio-economic processes (e.g., walkways, paths, access to land and water, ancestral/cultural significance), and effluents coming from the farm (e.g., water, 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 and even 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, a look at past impacts is part of the process.

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

A convenient way of conceptualizing social impacts is as changes to one or more of the following impact areas:

- *economic aspects* (influence on employment, or influence on other 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 add up to more 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 organized 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 prioritize 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 (positively or negatively) 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 minimum of a one-page summary with main outcomes is translated in the local language(s) that apply.

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 newly planned farm establishment. In any of these scenarios, 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 a need to compensate affected stakeholders for negative impacts 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

All of the steps outlined above can be done through various means. The extent of work and the depth of the analysis and data gathering depend largely on the size of the farm, as it is likely to be highly correlated to the geographical and population sizes of (potentially) affected communities. For most farms, the difference between methodology and size lies in the social aspects of a p-SIA process: the identification and meeting of stakeholders.

The following guidelines describe how large farms and small farms may use different methodologies and require different levels of support when doing a p-SIA (particularly steps 1, 3 and 6).

Large farms (16 ponds or 25 hectares and above) will need professional expertise to undertake a p-SIA, largely 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. The 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 familiar with, the area and its people. One such person may be able to plan, implement and report on a p-SIA. A useful way to engage stakeholders is through organizing so-called participatory rural appraisal (PRA) sessions wherein the classification of stakeholder-interests need to 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 in 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 human expertise available within the local community, such as a local schoolteacher or leader with social standing. The ability to read and write, the respectability to convene and chair a meeting and the social reputation of impartiality and integrity are all necessary basic skills. The impacts 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.

Informal meetings will suffice in which the differentiation between stakeholders and their specific interests need not be precisely known.

In group certification approaches (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 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 on a legally verifiable basis, such as 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 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 with regard to the p-SIA.

All other groups, cooperatives or clusters can, in group certification and with regard to 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**
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. 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-SIA through expertise available within the local community.

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.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.	Academic/NGO consultant and PRA methodology in p-SIA.
Single large-scale farms or cluster/cooperative including any large-scale farm applying for group certification.A large-scale farm is defined as having more than 15 ponds or more than 25 hectares of total production area.	Need professional expertise and BA methodology to undertake a p-SIA.

Note: "decision-making authority is local" means residing in an area within daily commuting distance. Decision-making authority (often determined by ownership, but sometimes not) refers to the actual mandate to make decisions on concerns and expectations of interested third parties) 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 and 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 against unlimited access, the restricted area is considered the production area.

Note: A (permanent) hired worker is defined as someone contracted for the duration of a production cycle or longer and who receives monetary compensation in exchange for the time he/she works on the farm. Hired labor, for specific short activities with the maximum duration of two weeks, such as harvesting, is not considered permanent hired labor. A family worker is defined as being first- or second-degree blood-related to the primary owner (male/female) 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 second-degree cousin doing work in exchange for accommodation and food, or two brothers sharing harvest revenues). First- or second-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 does not make a difference. Workers partially paid according to time/days and partially paid through share in product sales are considered "hired workers."

Auditing on a p-SIA

When auditing for this criterion, auditors need to look for the (apparent) completeness of a p-SIA report, and verify the manner in which 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 look at the documentation and whether it is appropriate and disseminated (is it informative, is it complete as to the steps outlined above, is it available in the local government and the community, and does listing dates of meetings and names of participants?), and cross-check with (some of the) participants to find out if the same 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 do 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 particular criterion, auditors need not verify the accuracy, robustness or quality of the data-gathering in a p-SIA report. Nor will auditors need to assess whether impacts are present or absent, as the p-SIA report will already have done that.

The frequency of audits on P3 is expected to be less in more technical-operational requirements in this standard, after initial compliance has been checked and found to be in order.

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) In listing stakeholders, in making impact descriptions, and in preparation of a final p-SIA report-document meetings with the listed stakeholders (or by stakeholders chosen representatives) have taken place.		
(c) These meetings have been minuted and these 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 (by stakeholders chosen) legally registered civil organization.-		
(e) B-EIA done and 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 probable impacts that are likely to be most important. 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 lead to if they indeed come about?” 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 that seems 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, made accessible to all members of the local community.		

Further reading:

International Finance Corporation (2007). *Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets.* Washington, D.C. [151]

Center for Good Governance (2006). *A Comprehensive Guide for Social Impact Assessment.* Andhra Pradesh, India[152]

World Resources Institute (2009). *Breaking Ground: Engaging Communities in Extractive and Infrastructure Projects.* Wash., D.C.: Herbertson, K., Ballesteros, A.R., Goodland, R., and Munilla, I.[153]

World Resources Institute (2007). *Development without Conflict: The Business Case for Community Consent.* Washington, D.C.: Herz, S., La Vina, A., Sohn, J. [154]

Oxfam Australia. (2010) *Guide to Free Prior and Informed Consent*. Victoria, Australia: Hill, C., Lillywhite, S. and Simon, M. [155]

HYPERLINK
www.rspo.org/files/resource_centre/RSPO%20Criteria%20Final%20Guidance%20with%20NI%20Document.pdf

www.rspo.org/files/project/smallholders/Final%20RSPO%20Guidance%20on%20Scheme%20Smallholders%20as%20approved.pdf

www.fsc.org/fileadmin/web-data/public/document_center/publications/smallholders_briefing_notes/Social_Impacts_briefing_note_high_res.pdf

[151] http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/p_StakeholderEngagement_Full/$FILE/IFC_StakeholderEngagement.pdf
[152] http://unpan1.un.org/intradoc/groups/public/documents/cgg/unpan026197.pdf
[153] http://pdf.wri.org/breaking_ground_engaging_communities.pdf
[154] http://pdf.wri.org/development_without_conflict_fpic.pdf
[155] http://www.oxfam.org.au/resources/pages/search.php?search=free+prior&Submit=%C2%A0%C2%A0Search%C2%A0%C2%A0

Appendix III: Contract farming arrangements

This guidance to P 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 information for guidance on how to engage in a contract farming arrangement in a fair and mutually 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 "deal" that is intended.

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

The contract should be written in a language common to the contracted party.
The contract should be written to be enforceable in a court of law of the country in which the contracted party operates.
The contract should define the parties by legal identity, signatory name and address and contact details. Signatures should be clearly visible on copies held by both parties.
The contract should define a starting date and an ending date.
The contract should identity the location of the farm the product is expected from, including the total production area size covered under the contract.
The contract should clearly specific the product in both quality and quantity terms. Quality definitions should be written in terms that are open to verification of the quality definition by both parties of the contract. 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.
It should state the time and manner of delivery of the product.
It should clearly 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.
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.
It should clearly indicate mutual obligations of both parties and spell out sanctions or consequences of not upholding those.
Arrangements covering insurance should be defined in the contract, or any absence of these clearly mentioned.

The contract should indicate the consequences of major failures to uphold commitments made in the contract, such as non-delivery of product and/or non-payment for received product, so-called “acts of God” (on the side of the contracted party), or bankruptcy (on the side of the contracting party).
Intermediate changes to contract conditions are communicated on paper and come with the right of either party to terminate the contract.
The contract should 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.
The contract shall define termination arrangements, review procedures, (intermediate) monitoring arrangements and under what circumstances and conditions a contract is transferable.

(adapted from FAO, Rome and GTZ, Kenya)

Recommendations to arrive at fair contract farming processes

Farmers and/or their representatives should best be given the opportunity to contribute to the drafting of the agreement and assist in the wording of 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 avoid many of the problems caused by 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 make an effort 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 into 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 a specific clause needs 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 specify the size and weight of the product, the degree of maturity and the manner in which 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, or with which, the product is to be produced. However, it is then best to ensure that the farmer understands these specifications (including the reasons for them) and to verify whether

compliance is both feasible and viable from the farmer's perspective.

In making the contracting arrangement, the contracting company is advised to check for possible unintended consequences of the proposed contract. Some key questions proactively asked can do a lot to avoid problems later. Questions may include:

Consequences for (local) food security of being asked to produce for a further-away market

Consequences for a person of another gender (other than the one actually negotiated with) in terms of income and/or work-load (e.g., typical unintended side effects may include differences in incentives or expectations within a household; such as "she works, he gets the money" or "typical female prioritization of subsistence farming vs. typical male prioritization of farming for income")

Possible consequences for farm workers who may not be part of the negotiations but who may be affected by the outcome

Understanding of contract conditions, technical specifications, financial arrangements and the (mutual) consequences of non-delivery

Pro-active clarification of arbitration procedures, termination procedures and renewal procedures

Pro-active clarification of harvesting procedures, pre-processing, processing and packaging requirements that may apply. Farmers should be encouraged to witness grading and weighing. In addition, it should be clarified how farmers can respond to a "no-show" by the designated collector to collect the product.

It will also help to agree on record-keeping systems and methodologies (e.g., traceability, quality control) and how intermediate inspections and monitoring can be arranged.

Adapted from working papers in DFID and SNV.

Further Reading:
http://www.srfood.org/images/stories/pdf/officialreports/srrtf_contractfarming_a-66-262.pdf

Appendix IV: Explanation of 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 only five criteria of sustainability, whereas a full assessment – such as that by the Marine Stewardship Council (MSC) – will typically cover more than 60. As such, the FishSource scores are not a firm guide 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 International Council for the Exploration of the Seas, 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}).

Components of the FishSource score

Issue	Measure	Underlying ratio
Is the management strategy precautionary?	Determine whether harvest rates are reduced at low stock levels.	$F_{advised}/F_{target\ reference\ point}$ or $F_{actual}/F_{target\ reference\ point}$
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, it will typically score 8 or more out of 10 on FishSource. If the fishery is judged to be doing okay, but requires improvement, then 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.

The key relation between the MSC scoring system and FishSource scores is “80<->8.” For example, a FishSource score of 8 or above would mean an unconditioned passing for that particular aspect on the MSC system. Sustainable Fisheries Partnership devised scores in a way that, departing from 8, a score of 6 relates to a score of 60, and below 6, an MSC “below 60,” “no-pass” condition. Please note, however, that the MSC criteria have been interpreted through time with a substantial degree of variability among fisheries. More information on FishSource is available at www.fishsource.org and an overview of the FishSource indices is available at: www.fishsource.org/indices_overview.pdf .

About scoring and availability of product meeting a minimum score

A typical full assessment of a fishery through the MSC will include significantly more areas/criteria assessed than through FishSource, typically including more than 60 sustainability criteria. 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 that scored between 60 and 80, with the intention of achieving a score of 80 or above in every area of the fishery.

Appendix V: Feed resource calculations and methodologies

Forage Fish Efficiency Ratio calculation

Feed Fish Efficiency Ratio (FFER) is the quantity of wild fish used per quantity of cultured fish produced. This measure can be weighted for fish meal or fish oil, whichever component creates a larger burden of wild fish in feed. Currently, in the case of shrimp, the fish meal will be the determining factor for the FFER 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.

EMBED Equation.3

Where:

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

EMBED Equation.3

The percentage of fishmeal and fish oil excludes fishmeal and fish oil derived from fisheries by-products.[156] 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 FFER. Fishmeal and fish oil derived from fisheries by-products (e.g., trimmings and offal) should not be included because the FFER is intended to be a calculation of direct dependency on wild fisheries.

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

FFER is calculated for the grow-out period.

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

Appendix VI: Calculations for nitrogen and phosphorus load calculations

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 take into account 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 lower are allowed to make a theoretical calculation as follows:

N load kg/ton shrimp = N input in kg x 0.3 / tons of shrimp produced
P load kg/ton shrimp = P input in kg x 0.2 / tons of shrimp produced

Where:
N/P input = kg of N/P inputs from feeds and fertilizers

Feed N/P (kg) = (kg Feed 1 applied) x (% N/P Feed 1 content) + (kg Feed 2 applied) x (% N/P Feed 2 content) + etc.
Fertilizer N/P (kg) = (kg Fertilizer 1 applied) x (% N/P Fertilizer 1 content) + (kg Fertilizer 2 applied) x (% N/P Fertilizer 2 content) + etc.

Farms that do not meet the above criteria are required to proceed to calculations using one of the following methods:

Farms that control the discharge of effluents and can actually measure the volume of effluent water:

NP load (kg/ton shrimp) = ((NP concentration in effluent water in mg/L – NP concentration in supply water in mg/L) x volume of effluent water in m3) / 1000 x tons of shrimp produced

Farms that cannot measure the volume of effluent water:

NP load (kg/ton shrimp) = (((NP concentration in effluent water in mg/L - NP concentration in supply water in mg/L) x volume of pond water in m3 x average number of production cycles per pond over 12 months) + ((NP water concentration in pond in mg/L - NP concentration in supply water in mg/L)) x volume of pond water in m3 x average daily % water renewal x average number of production cycles per pond over 12 months)) / 1000 x tons of shrimp produced over 12 months

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 pumping;

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.