

**AUDIT MANUAL - ASC TILAPIA STANDARD**

Created by the Tilapia Aquaculture Dialogue

Version 1.1: Ten audit references have been added at the end of this audit manual. Content of audit manual remained unchanged.



Scope: Species of the Family Cichlidae commonly referred as Tilapia (*Oreochromis niloticus*, *O. mossambica*, *O. aureus* and *O. hybrids*)

**PRINCIPLE 1. OBEY THE LAW AND COMPLY WITH ALL NATIONAL AND LOCAL REGULATIONS**

*1.1 Criteria: Evidence of legal compliance*

		<b>Compliance Criteria (Required Client Actions):</b>	<b>Auditor Evaluation (Required CB Actions):</b>
1.1.1	<p><b>Indicator:</b> Presence of documents proving compliance with local and national authorities on land and water use (e.g., permits, evidence of lease, concessions and rights to land and/or water use)</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. Maintain copies of applicable land and water use laws.	A. Review compliance with applicable land and water use laws.
		b. Maintain original lease agreements or land titles on file.	B. Confirm client holds original lease agreements or land titles.
		c. Keep records of inspections for compliance with national and local laws and regulations (only if such inspections are legally required in the country of operation).	C. Review inspection records for compliance with national and local laws and regulations (as applicable).
		d. Obtain permits and maps showing that farm does not conflict with national preservation areas.	D. Verify facility does not conflict with national preservation areas.
1.1.2	<p><b>Indicator:</b> Presence of documents proving compliance with all tax laws</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. Keep records of tax payments.	A. Verify client has records of tax payments to appropriate jurisdiction(s).
		b. Maintain copies of tax laws for jurisdiction(s) where company operates.	B. Confirm client has a basic knowledge of tax requirements for farm.
		c. Register with national or local authorities as an "aquaculture activity".	C. Verify client is registered with local or national authorities.
1.1.3	<p><b>Indicator:</b> Presence of documents proving compliance with all labor laws and regulations</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. Maintain copies of national labor codes and laws applicable to farm.	A. Confirm client has specified documentation.
		b. Keep records of farm inspections for compliance with national labor laws and codes (only if such inspections are legally required in the country of operation).	B. Review inspection records for compliance with national labor laws and codes (as applicable).
1.1.4	<p><b>Indicator:</b> Presence of documents proving compliance with regulations or permits concerning water quality impacts</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. Obtain permits for water quality impacts where applicable.	A. Verify that client obtains permits as applicable.
		b. Comply with all discharge laws or regulations.	B. Review evidence of compliance with discharge laws or regulations.
		c. Maintain records of monitoring and compliance with discharge laws and regulations as required.	C. Verify that records show compliance with discharge laws and regulations.

**PRINCIPLE 2. MANAGE THE FARM SITE TO CONSERVE NATURAL HABITAT AND LOCAL BIODIVERSITY**

*2.1 Criteria: Site information*

		<b>Compliance Criteria (Required Client Actions):</b>	<b>Auditor Evaluation (Required CB Actions):</b>
2.1.1	<p><b>Indicator:</b> Site location, history and stewardship activities matrix located in Appendix 1, Table 1 is completed and validated</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. Complete the Receiving Water Information Checklist in Audit Reference 2 (Table 1 in Appendix 1 of the Standard).	A. Do not schedule on-site audit of client until checklist review is complete.
		b. Submit checklist and attachments to CB before the on-site audit.	B. Review client submission for completeness, accuracy, and currency of information. Request clarification if needed.

			C. Verify client information by cross-checking with independent sources (e.g. local authorities).
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2.2 Criteria: Presence of natural or established tilapia species		Compliance Criteria (Required Client Actions):	Auditor Evaluation (Required CB Actions):
2.2.1	<p><b>Indicator:</b> Demonstration that the tilapia species cultured is established<sup>[1]</sup> and naturally reproducing in the receiving waters<sup>[2]</sup>, of the operation on or before 1 January 2008<sup>[3]</sup></p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All farm locations outside Africa (see 2.2.2), Farm-Wide</p>	<p>a. Collect documentary evidence that cultured species was established in receiving waters on or before 1 January 2008, or Collect first hand accounts showing evidence for natural reproduction of tilapia species in receiving waters on or before 1 January 2008. Submit evidence with checklist (Audit Reference 2).</p>	<p>A. Review evidence for compliance with the Requirement. Acceptable documentary evidence: peer-reviewed literature; verifiable Environmental Impact Assessment; and government certification.</p> <p>Acceptable first hand accounts: community testimonials and direct evidence for multiple size classes of tilapia species in receiving waters captured with cast nets, trapping devices or fishing.</p>
		<p>b. If system does not have receiving waters according as defined in this requirement<sup>[2]</sup> then the requirements of Indicator 2.2.1 are not applicable.</p>	<p>B. Auditor response to 2.2.1A is “not applicable” (NA).</p>
		<p>c. If water is discharged into municipal water systems, show that there is a mechanism for treating effluent to eradicate/eliminate macro-biological organisms such as fish.</p>	<p>C. Review evidence to confirm compliance.</p>
Footnote	<p><sup>[1]</sup> “A non-indigenous species is considered established if it has a reproducing population within the basin, as inferred from multiple discoveries of adult and juvenile life stages over at least two consecutive years. Given that successful establishment may require multiple introductions, species are excluded if their records of discoveries are based on only one or a few non-reproducing individuals whose occurrence may reflect merely transient species or unsuccessful invasions.” (National Oceanic and Atmospheric Administration)</p>		
Footnote	<p><sup>[2]</sup> “Receiving water” is defined as all distinct bodies of water that receive runoff or waste discharges, such as streams, rivers, ponds, lakes and estuaries (adapted from World Health Organization). This does not include farm-constructed water courses, impoundments or treatment facilities.</p>		
Footnote	<p><sup>[3]</sup> Where there are no-discharge systems, or no discharge to receiving waters, requirements 2.2.1 and 2.2.2 are not applicable.</p>		
2.2.2	<p><b>Indicator:</b> In Africa, demonstration that the tilapia species and strain cultured is established and naturally reproducing in the receiving waters of the operation or before 1 January 2008</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> Farms located in Africa only (see 2.2.1), Farm-Wide</p>	<p>a. Collect documentary evidence that cultured species and strain was present in receiving waters on or before 1 January 2008 or Collect first hand accounts showing evidence for natural reproduction of tilapia species and strain in receiving waters on or before 1 January 2008. Submit evidence with checklist (Audit Reference 2).</p>	<p>A. Review evidence for compliance with the Requirement. Acceptable documentary evidence: peer-reviewed literature; verifiable Environmental Impact Assessment; and government certification.</p> <p>Acceptable first hand accounts: community testimonials and direct evidence for multiple size classes of tilapia species in receiving waters captured with cast nets, trapping devices or fishing.</p>
		<p>b. If system does not have receiving waters as defined in this Requirement<sup>[2]</sup> then the requirements of Indicator 2.2.2 are not applicable.</p>	<p>B. Auditor response to 2.2.2A is “not applicable” (NA).</p>
		<p>c. If water is discharged into municipal water systems, show that there is a mechanism for treating effluent to eradicate/eliminate macro-biological organisms such as fish.</p>	<p>C. Review evidence to confirm compliance.</p>

2.3 Criteria: The effects of eutrophication		Compliance Criteria (Required Client Actions):	Auditor Evaluation (Required CB Actions):
2.3.1	<p><b>Indicator:</b> The percent change in diurnal dissolved oxygen of receiving waters relative to dissolved oxygen at saturation for the water's specific salinity and temperature</p> <p><b>Requirement:</b> ≤ 65%</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p><b>Instruction to Clients for Indicator 2.3.1 - Diurnal Difference in Dissolved Oxygen (DDDO)</b></p> <ul style="list-style-type: none"> <li>- Sampling for DDDO is done at least once per month and is measured only at Receiving Water Farm Afar (RWFA) site.</li> <li>- Measure dissolved oxygen (DO), conductivity (or salinity), and temperature at 0.3 m depth. Take all three measurements at the same time.</li> <li>- For each monthly sampling of DDDO, take measurements two times: 1 hour before sunrise and 2 hours before sunset.</li> <li>- Equations for calculating DDDO are given in Audit Reference 6 (also Equation 1 in Appendix III of the Standard).</li> </ul> <p>Note 1: For farms located in temperate zones, audits will occur during the 4-month window of peak primary productivity in receiving waters.</p> <p>Note 2: For farms where thermal destratification occurs (a natural event when oxygen is depleted due to mixing of deep waters with surface waters), the detection of low oxygen concentration will be recorded but will not be considered a non-conformance.</p> <p>Note 3: The pre-sunset measurements are taken at the same time that samples are collected for water quality monitoring (see Instructions for 2.5.1) at the day of the audit.</p>	
		a. Collect ≥ 12 months of DDDO samples if farm was built after December 2009 (farms built before December 2009 need only 6 months of data).	A. Do not schedule on-site audit until client provides baseline DDDO data.
		b. Calibrate all equipment at the frequency and by the method recommended by the manufacturer. Calibrate daily if there is no manufacturer's recommendation.	B. Verify that client calibrates equipment as required.
		c. Adjust DO at saturation to reflect temperature, salinity and altitude during calibration or in calculations (see Audit Reference 6).	C. Verify that client adjusts for temperature, salinity and altitude through calibration or in calculations (Audit Reference 6).
		d. Calculate DDDO using equation 1 (Audit Reference 6) and oxygen saturation values (Audit Reference 5). Enter DDDO values into Water Quality Monitoring Matrix (Audit Reference 4).	D. Review Water Quality Monitoring Matrix. Verify that all DDDO measurements from the receiving water comply with the Requirement.
		e. Calculate average annual DDDO for the prior 12-month period. Enter result into Water Quality Monitoring Matrix (Audit Reference 4).	E. Review monitoring matrix and confirm that mean annual DDDO ≤ 65 %.
		f. Arrange to take DO measurements while the auditor is at the farm.	F. Witness client measuring DO. On-site values should fall within range of farm data for DDDO. If an out of range measurement is observed, raise a non-conformity.
2.4 Criteria: Water quality in oligotrophic receiving waters		Compliance Criteria (Required Client Actions):	Auditor Evaluation (Required CB Actions):
2.4.1	<p><b>Indicator:</b> Secchi disk visibility<sup>[4]</sup> limit above which production is not certifiable</p> <p><b>Requirement:</b> 10 meters</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p><b>Instruction to Clients for Indicator 2.4.1 - Upper Limit of Secchi Disk Visibility (SD)</b></p> <p>The TAD concluded that "Water bodies with an average annual Secchi disk visibility at or above 10 meters are not permitted to be used as receiving waters under the ISRTA because of their ecological uniqueness and rarity." Thus, Indicator 2.4.2 sets an upper limit on eligibility for certification: SD ≤ 10 m.</p> <ul style="list-style-type: none"> <li>- Testing of the upper limit of SD is done only at the RWFA sampling station.</li> <li>- When depth at RWFA station is &lt; 10 meters, the Requirement does not apply.</li> <li>- The required methods and equipment for measuring SD are given in Audit Reference 1.</li> </ul>	
		a. Collect ≥ 12 months of SD readings at RWFA station (for first audits, farm must have ≥ 6 months of data). Enter SD values into Water Quality Monitoring Matrix (Audit Reference 4).	A. Review matrix to verify that average annual SD < 10 m. If average annual SD equals or exceeds 10 m, production is not certifiable.
		b. Arrange to take SD measurements at RWFA during the audit of the farm. The auditor will witness and replicate your SD measurements.	B. Witness client measuring SD. Repeat the SD measurement yourself at the same time and location. Record both sets of values.

			C. Calculate percent error of farm data using Equation 2 (Audit Reference 6). If < 5% difference is observed between auditor and farm min and max SD readings, then accept the annual average from farm data. If > 5% difference is observed between auditor and farm min and max SD readings, then raise a non-conformity (see Audit Reference 3).
Footnote	[4] Measurements shall be taken at the Receiving Water Farm Afar (RWFA) sampling station. See Appendix II for RWFA definition.		
2.4.2	<p><b>Indicator:</b> Compliance with Requirements 2.4.3. &amp; 2.4.4. when Secchi disk visibility<sup>[4]</sup> ≤ 5.0 meters</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p><b>Instruction to Clients for Indicator 2.4.2 - Decision about Oligotrophy using SD</b></p> <p>The TAD concluded that it was necessary to protect oligotrophic waters from excessive nutrient loading. They imposed strict limits on concentration of Total Phosphorus (Indicator 2.4.3) and Chlorophyll <i>a</i> (Indicator 2.4.4). To decide whether a given waterbody is oligotrophic or not, the TAD mandated a functional definition: "Oligotrophic receiving waters are characterized as those that have a Secchi disk visibility equal to or greater than 5.0 meters." Thus, the Secchi disk measurement (SD) will determine whether Standard nutrient limits shall apply to a given receiving water. The flow chart in Audit Reference 7 shows how to make decisions using SD measurements.</p> <p>A few points about the logic of the decision-making process must be noted:</p> <ul style="list-style-type: none"> <li>- Highly oligotrophic waters (i.e. where the average annual SD is &gt; 10 m) are automatically ineligible from certification because they do not comply with Indicator 2.4.1.</li> <li>- The decision about oligotrophy is made based solely on SD measurements taken at RWFA (i.e. SD measures from RWRP, RWFO or other locales are not considered).</li> <li>- The auditor will verify accuracy of farm SD measurements while on site. Where farm and auditor measurements differ, the auditor's SD measurement shall prevail.</li> <li>- When deciding if Requirement nutrient limits apply to a receiving water body, the auditor shall also compare the annual average SD to the on-site SD measurement.</li> <li>- If water depth at RWFA is &lt; 5.0 meters and the SD measurement is to 'bottom' then 2.4.3 and 2.4.4 are not applicable.</li> </ul> <p>Note: If the client suspects that an abrupt reduction in SD as measured by the auditor (e.g. case D below) was caused by natural seasonal variations (i.e. summer blooms or rainy season turbidity), the client may request exemption from 2.4.3 and 2.4.4 but only if it can be shown annual average SD has not decreased by &gt; 5% over the previous 2 years.</p>	
		a. If auditor measurement shows SD > 5.0 m and annual mean SD < 5.0 m, then (see next column -->)	A. Proceed to Indicator 2.4.3 and 2.4.4.
		b. If auditor measurement shows SD > 5.0 m and annual mean SD > 5.0 m, then (see next column -->)	B. Stop
		c. If auditor measurement shows SD ≤ 5.0 m and annual mean SD < 5.0 m, then (see next column -->)	C. Stop
		d. If auditor measurement shows SD ≤ 5.0 m and annual mean SD > 5.0 m, then (see next column -->)	D. Proceed to Indicator 2.4.3 and 2.4.4.
2.4.3	<p><b>Indicator:</b> Total phosphorus concentration limit in receiving waters<sup>[4]</sup></p> <p><b>Requirement:</b> ≤ 20 µg/L</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. If required under Indicator 2.4.2, collect water samples at RWFA. Determine total phosphorus concentration.</p> <p>b. Report results to CB.</p>	<p>A. Take duplicate water sample at RWFA. Have sample analyzed by a qualified independent laboratory for total phosphorus concentration (for handling, see Indicator 2.5.1)</p> <p>B. Calculate percent error of farm data using Equation 2 (Audit Reference 6). If &gt; 5% difference is observed between auditor data and farm min/max, raise a non-conformity (see Audit Reference 3).</p>

	c. Analyze total phosphorus concentrations in all subsequent water samples from monthly water quality monitoring. Continue until instructed otherwise by the CB.	C. Verify that samples from receiving waters comply the Requirement.
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2.4.4	<b>Indicator:</b> Chlorophyll <u>a</u> concentration limit in receiving waters <sup>[4]</sup> <b>Requirement:</b> ≤ 4.0 µg/L <b>Applicability:</b> All Farms, Farm-Wide	a. If required under Indicator 2.4.2, collect water samples at RWFA. Determine chlorophyll <u>a</u> concentration.	A. Take duplicate water sample at RWFA. Have sample analyzed by a qualified independent laboratory for chlorophyll <u>a</u> concentration (for handling, see Indicator 2.5.1)
		b. Report results to CB.	B. Calculate percent error of farm data using Equation 2 (Audit Reference 6). If > 5% difference is observed between auditor data and farm min/max, raise a non-conformity (see Audit Reference 3).
		c. Analyze chlorophyll <u>a</u> concentrations in all subsequent water samples from monthly water quality monitoring. Continue until instructed otherwise by the CB.	C. Verify that samples from receiving waters comply the Requirement.
<b>2.5 Criteria: Receiving water monitoring</b>		<b>Compliance Criteria (Required Client Actions):</b>	
2.5.1	<b>Indicator:</b> Receiving water quality monitoring matrix completed and validated (Appendix II) <b>Requirement:</b> Yes (6 months data, pre-audit, required) <b>Applicability:</b> All Farms, Farm-Wide	<b>Instruction to Clients for Indicator 2.5.1 - Water Quality Monitoring</b> - Required parameters for the water quality monitoring program are shown in Appendix II of the Standard. - Samples are collected from each of the 3 sampling stations: RWRP; RWFO; and RWFA. - A minimum of one sample is taken per station but the TAD encourages multiple sampling to investigate waterbody dynamics. - Water samples are taken from a 1-meter column of water or deeper. - Water samples are taken 2 hours before sunset. - Water samples must be kept in sealed coolers and kept at a temperature of less than 10°C. Note 1: Laboratories used by the auditor for analyses not performed on site with auditor equipment will use ISO methods as described in Audit Reference 1, and farms are suggested to periodically send water samples to these laboratories to assure farm analyses are within a 5% level of error. Note 2: Water samples from RWFA should be taken at the same time that DO is measured for the calculation of DDDO (see Instructions for Indicator 2.3.1) at the day of the audit.	
		a. Conduct ≥ 6 months of water quality monitoring before first audit.	A. Do not schedule the on-site audit until client has monitoring dataset.
		b. Complete the Water Quality Monitoring Matrix (Audit Reference 4) and submit to CB.	B. Review Matrix to verify that client monitored all required parameters at the required frequency.
		c. Calibrate all equipment at the frequency and by the method recommended by the manufacturer. Calibrate daily if there is no manufacturer's recommendation.	C. Verify that client calibrates equipment as required.
		d. During the audit of the farm, arrange to conduct water quality monitoring. The auditor will witness and replicate water sampling.	D. Witness client conducting water quality monitoring. Repeat on-site measurements at the same time and location. Record both sets of values.
		e. Collect water samples and prepare them for shipment as applicable.	E. Collect duplicates of water samples for independent analyses performed by either the CB or an independent laboratory (i.e. not by farm staff). At a minimum, the independent analyses shall include determination of: chlorophyll <u>a</u> (µg/L), phosphate-phosphorus (µg/L), ammonia-nitrogen (µg/L), and turbidity (NTU). Keep samples in a sealed cooler at < 10°C.

		f. Perform routine analysis of water samples (i.e. done in the same manner as for previous months of water quality monitoring).	F. Keep samples under auditor control until analyses are complete or until samples are placed into custody of a qualified independent laboratory.
		g. Record values for each parameter and submit results to CB.	G. Calculate percent error of farm data using Equation 2 (Audit Reference 6). If > 5% difference is observed between auditor and farm data, raise a non-conformity (see Audit Reference 3).
<b>2.6 Criteria: Wetland conservation</b>		<b>Compliance Criteria (Required Client Actions):</b>	<b>Auditor Evaluation (Required CB Actions):</b>
2.6.1	<b>Indicator:</b> Hectares of allowable wetland <sup>[5]</sup> conversion since 1999 <sup>[6]</sup> <b>Requirement:</b> 0 ha <b>Applicability:</b> All Farms, Farm-Wide	a. Provide a map delineating all wetlands currently within a 5-km radius of the farm.	A. Evaluate whether there is evidence for any wetland conversion occurring within a 5-km radius of the farm since 1999.
		b. Prepare a map showing pre- and post-1999 wetland coverage at farm site.	B. If evidence shows that farm siting or related activities have resulted in loss of wetland habitat since 1999, then the client is not certifiable.
Footnote	<sup>[5]</sup> "Wetland is defined as lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface." (United States Environmental Protection Agency)		
Footnote	<sup>[6]</sup> The year Ramsar contracting parties adopted strategic framework for the development of the Ramsar List		
<b>PRINCIPLE 3. CONSERVE WATER RESOURCES</b>			
<b>3.1 Criteria: Nutrient utilization efficiency</b>		<b>Compliance Criteria (Required Client Actions):</b>	<b>Auditor Evaluation (Required CB Actions):</b>
3.1.1	<b>Indicator:</b> The total amount of phosphorus added to the culture system per metric ton of fish produced per year. Use equations from Appendix III. <b>Requirement:</b> ≤ 27 kg <b>Applicability:</b> All Farms, Unit of Certification Only Clients may omit/delete pricing details from purchase documents.	a. Calculate total weight of feed used. Keep invoices.	A. Review invoices to confirm the total weight of feed used.
		b. Calculate total weight of all fish purchased. Keep invoices.	B. Review invoices to confirm the total weight of fish purchased.
		c. Calculate total weight of fish produced. Keep invoices for all fish sold or shipped.	C. Review invoices to confirm the total weight of fish sold or shipped.
		d. Obtain a signed letter from feed manufacturer stating phosphorus content of the feed.	D. Confirm that a letter from the feed manufacturer states phosphorus content.
		e. Complete nutrient budget worksheet (Audit Reference 8).	E. Review nutrient budget worksheet for accuracy.
		-	F. Confirm that total phosphorus added does not exceed requirement.



		<i>Farms without post-culture treatment for phosphorus</i>	<i>Farms without post-culture treatment for phosphorus</i>
3.1.2A	<p><b>Indicator:</b> The total amount of phosphorus released from the culture system per metric ton of fish produced per year. Phosphorus loading will be either calculated using equations from Appendix III or measured in effluent if there is post-culture treatment.</p> <p><b>Requirement:</b> ≤ 20 kg</p> <p><b>Applicability:</b> Farms with no post-culture treatment for phosphorus, Unit of Certification Only</p> <p>Clients may omit/delete pricing details from purchase documents.</p>	a. Calculate total weight of feed used. Keep invoices.	A. Review invoices to confirm the total weight of feed used.
		b. Calculate total weight of all fish purchased. Keep invoices.	B. Review invoices to confirm the total weight of fish purchased.
		c. Calculate total weight of fish produced. Keep invoices for all fish sold or shipped.	C. Review invoices to confirm the total weight of fish sold or shipped.
		d. Complete nutrient budget worksheet (Audit Reference 8)	D. Review nutrient budget worksheet for accuracy.
		-	E. Confirm that phosphorus released does not exceed requirement.
		<i>Farms with post-culture treatment for phosphorus</i>	<i>Farms with post-culture treatment for phosphorus</i>
3.1.2B	<p><b>Indicator:</b> The total amount of phosphorus released from the culture system per metric ton of fish produced per year. Phosphorus loading will be either calculated using equations from Appendix III or measured in effluent if there is post-culture treatment.</p> <p><b>Requirement:</b> ≤ 20 kg</p> <p><b>Applicability:</b> Farms that use post-culture treatment for phosphorus, Unit of Certification Only</p> <p>Clients may omit/delete pricing details from purchase documents.</p>	f. Complete steps a-d (above) for Indicator 3.1.2A.	F. Complete steps A-D (above) for Indicator 3.1.2A.
		g. Describe method for treatment (e.g. sludge removal for fertilizer, water treatment facilities, etc.) and means of quantifying phosphorus capture.	G. View evidence for effective post-culture treatment.
		h. Keep records of the quantity of phosphorus captured by treatment.	H. Review records for phosphorus capture.
		i. Subtract net phosphorus captured in treatment facility from total output of phosphorus, expressed as kg P/mt fish produced over prior 12-month period.	I. Review calculations for accuracy.
		-	J. Confirm that the total amount of phosphorus released does not exceed requirement.
3.1.3	<p><b>Indicator:</b> Calculation and verification of the total amount of nitrogen applied to the culture system. Use equations from Appendix III.</p> <p><b>Requirement:</b> Measured in kg nitrogen/mt fish/year</p> <p><b>Applicability:</b> All Farms, Unit of Certification Only</p> <p>Clients may omit/delete pricing details from purchase documents.</p>	a. Calculate total weight of feed used. Keep invoices.	A. Review invoices to confirm the total weight of feed used.
		b. Calculate total weight of all fish purchased. Keep invoices.	B. Review invoices to confirm the total weight of fish purchased.
		c. Calculate total weight of fish produced. Keep invoices for all fish sold or shipped.	C. Review invoices to confirm the total weight of fish sold or shipped.
		d. Obtain a signed letter from feed manufacturer stating nitrogen content of the feed.	D. Confirm that a letter from the feed manufacturer states nitrogen content.
		e. Complete nutrient budget worksheet (Audit Reference 8)	E. Review nutrient budget worksheet for accuracy.

3.1.4	<p><b>Indicator:</b> Calculation and verification of the total amount of nitrogen released from the farming activity. Use equations from Appendix III.</p> <p><b>Requirement:</b> Measured in kg nitrogen/mt fish/year</p> <p><b>Applicability:</b> All Farms, Unit of Certification Only</p> <p>Clients may omit/delete pricing details from purchase documents.</p>	a. Calculate total weight of feed used. Keep invoices.	A. Review invoices to confirm the total weight of feed used.
		b. Calculate total weight of all fish purchased. Keep invoices.	B. Review invoices to confirm the total weight of fish purchased.
		c. Calculate total weight of fish produced. Keep invoices for all fish sold or shipped.	C. Review invoices to confirm the total weight of fish sold or shipped.
		d. Use equation from Audit Reference 6 to calculate total amount of nitrogen released.	D. Confirm calculation.
		e. Complete nutrient budget worksheet (Audit Reference 8)	E. Review nutrient budget worksheet for accuracy.
<b>3.2 Criteria: Groundwater salinization</b>		<b>Compliance Criteria (Required Client Actions):</b>	<b>Auditor Evaluation (Required CB Actions):</b>
3.2.1	<p><b>Indicator:</b> Percent change in specific conductance of freshwater from a drilled well at the time of drilling and the time of audit. This is required when freshwater wells are used in combination with brackish surface water for the culture of tilapia. Freshwater aquifers are defined as having a specific conductance less than 1,300 µS/cm.</p> <p><b>Requirement:</b> ≤ 10 %</p> <p><b>Applicability:</b> Only farms where brackish water is used for tilapia culture, Farm-Wide</p>	a. Inform CB if brackish water is used for tilapia culture (3.2.1 applies only to farms where surface water is > 1,300 µS/cm or initial well water is < 1,300 µS/cm).	A. Confirm whether client uses brackish water for tilapia culture. If not, then auditor response to 3.2.1B-E is "not applicable" (NA).
		b. Show well locations on map of farm.	B. Confirm well locations.
		c. Record date of drilling and initial specific conductance (µS/cm) at each well.	C. Retain a record of location and initial specific conductance for wells.
		d. Measure specific conductance of all wells less than 4 weeks before audit.	D. Review updated measurements of specific conductance. Compare values to initial measurements taken from the same wells.
		-	E. Verify that specific conductance at wells did not change by > 10 %.
<b>PRINCIPLE 4. CONSERVE SPECIES DIVERSITY AND WILD POPULATIONS</b>			
<b>4.1 Criteria: Escapes from aquaculture facilities</b>		<b>Compliance Criteria (Required Client Actions):</b>	<b>Auditor Evaluation (Required CB Actions):</b>
4.1.1	<p><b>Indicator:</b> Presence of net mesh or grills/screens, barriers on inlets and outlets of culture vessels (e.g., tanks, ponds and raceways), and mesh on all netted confinement units (e.g., cages and impoundments), appropriately sized to retain the stocked fish</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. Install net mesh, screens and barriers in required locales.	A. Inspect site to verify that net mesh, screens and barriers are in place.
		b. Use meshes that are appropriately sized to retain stocked fish.	B. Inspect site to verify meshes are appropriately sized to retain stocked fish.
4.1.2	<p><b>Indicator:</b> Presence of net mesh, or grills/screens and permanent barrier inspection register recording dates, findings and actions taken, including mitigation or fish containment structure repairs</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. Establish program for regular inspection of permanent barriers.	A. Inspect site to verify effectiveness of inspection program.
		b. Record the dates, findings and actions taken in an 'Inspection Register'.	B. Review records.
		c. Collect data for 6 months before first audit.	C. Do not schedule the first audit until client submits 6 months of inspection data.

4.1.3	<p><b>Indicator:</b> Presence of trapping devices placed in effluent/drainage canals or in between cages to sample for escapees, and a record of findings and actions taken</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. Establish program for monitoring escapes with trapping devices.	A. Inspect farm to verify that trapping devices are used in an effective and representative way for monitoring escapees.
		b. Record all traps used, findings and actions taken.	B. Review records.
		C. Collect data for 6 months before first audit.	C. Do not schedule the first audit until client submits 6 months of monitoring data.
4.1.4	<p><b>Indicator:</b> In cage culture systems, the minimum distance between the bottom of the cage and the bottom of the receiving waters where the cage is placed</p> <p><b>Requirement:</b> ≥ 3.0 m</p> <p><b>Applicability:</b> Cage systems only, Farm-Wide</p>	-	A. For cage systems, confirm that distance between cage bottom and bottom sediment is ≥ 3 m.
4.1.5	<p><b>Indicator:</b> The minimum percentage of males or sterile fish in a culture unit</p> <p><b>Requirement:</b> 95 %</p> <p><b>Applicability:</b> Land-based systems only, Farm-Wide</p>	<i>If the farm is a land-based system, the client shall arrange to have tilapia cultures sampled for percentage of male fish (or sterile fish) as follows:</i>	<i>For land-based systems, the auditor shall confirm that clients follow requirements for determination of percentage of male fish (or sterile fish) in culture.</i>
		a. Select three (3) culture vessels at random.	A. Verify samples were selected at random.
		b. Capture 40 fish from each culture vessel for a total of 120 fish.	B. Verify that fish originated from different culture vessels.
		c. Determine the number of fish in the sample that are male (or sterile).	C. Verify method used to determine sex (or sterility).
		d. Calculate the percentage of male fish (or sterile fish) in culture.	D. Review results to confirm compliance with the requirement.
e. Alternate approach when farm has fewer than 3 culture vessels: capture a total of 100 fish and determine the percentage male fish (or sterile fish).	E. As for 4.1.5D.		
<b>4.2 Criteria: Transporting live tilapia</b>		<b>Compliance Criteria (Required Client Actions):</b>	<b>Auditor Evaluation (Required CB Actions):</b>
4.2.1	<p><b>Indicator:</b> Presence and evidence of use of fish transport containers that have no escape path for fish</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. For transport of live fish to the farm (e.g. fry), ensure that containers do not provide escape paths for fish.	A. Inspect site to verify containers do not provide escape paths for live fish transported to the farm.
		b. For transport of live fish away from the farm (e.g harvested fish), ensure that containers do not provide escape paths for fish.	B. Inspect site to verify containers do not provide escape paths for live fish transported from the farm.
<b>4.3 Criteria: Transgenic fish</b>		<b>Compliance Criteria (Required Client Actions):</b>	<b>Auditor Evaluation (Required CB Actions):</b>
4.3.1	<p><b>Indicator:</b> Allowance for the culture of transgenic tilapia</p> <p><b>Requirement:</b> No (None allowed)</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. Maintain records for the origin of all cultured stocks including the supplier name, address and contact person(s) for stock purchases.	A. Review records to confirm compliance with the requirement
		b. Purchase documents must confirm that culture stock is not transgenic.	B. If the auditor suspects that transgenic fish are in culture, test stock identity by collecting 3 fish and sending to an ISO 17025 certified laboratory for genetic analysis.

4.4 Criteria: Predator control		Compliance Criteria (Required Client Actions):	Auditor Evaluation (Required CB Actions):
4.4.1	<b>Indicator:</b> Use of lethal <sup>[7]</sup> predator control	a. Prepare a list of all predator control devices and their locations.	A. Review list.
	<b>Requirement:</b> No (None allowed)		
	<b>Applicability:</b> All Farms, Farm-Wide	-	B. Inspect sites to verify no use of lethal predator controls.
Footnote	<sup>[7]</sup> The use of lethal predator control is prohibited, unless a predator becomes impinged in netting and is required to be euthanized.		
4.4.2	<b>Indicator:</b> Mortality of IUCN red listed species <b>Requirement:</b> 0 (zero) <b>Applicability:</b> All Farms, Farm-Wide	<b>Instruction to Clients for Indicator 4.4.2 - Presence of IUCN Red List Species</b> Determine whether IUCN red list species are present in the region as follows: - go to <a href="http://www.iucnredlist.org/">http://www.iucnredlist.org/</a> - follow to "other search options" - select "Taxonomy" - select "Animalia" - indicate appropriate "Location", "Systems", "Habitat", - click on "run search" and record species listed and whether they are threatened by the farming activity. Note: The IUCN Red List uses nine categories for ranking species according to threat, and search results may include species that are not currently threatened. For the purposes of determining whether a farm complies with indicator 4.4.2, species in the following IUCN categories may be excluded from further analyses: "Not evaluated", "Data Deficient", and "Least Concern".	
		a. Perform analysis. Record all IUCN red list species and farm-related threats.	A. Repeat analysis to verify that client obtained an accurate result.
		b. If an IUCN Red List species is identified in region of the farm (including receiving and source waters), take appropriate precautions.	B. Verify that client takes appropriate precautions as required.
<b>PRINCIPLE 5. USE RESOURCES RESPONSIBLY</b>			
5.1 Criteria: Use of wild fish for feed (fishmeal and oil)		Compliance Criteria (Required Client Actions):	Auditor Evaluation (Required CB Actions):
5.1.1	<b>Indicator:</b> Feed Fish Equivalence Ratio (FFER). See Appendix IV for feed calculations. <b>Requirement:</b> ≤ 0.8 <b>Applicability:</b> All Farms, Unit of Certification Only	a. Obtain a signed letter from feed manufacturer stating percentage of fish meal and/or fish oil (Audit Reference 9) in feed used during the past 12 months.	A. Verify that values are stated in a letter from the feed manufacturer.
		b. For FFER calculations, exclude fish meal and fish oil derived from rendering of seafood by-products (e.g. the 'trimmings' from a human consumption fishery).	B. Verify client excludes rendered seafood byproducts from calculation of FFER.
		c. Calculate FFER using equations in Audit Reference 6 (also Appendix IV of Standard).	C. Verify that FFER calculations were done correctly.
		-	D. Confirm that FFER complies with the Requirement

5.1.2	<p><b>Indicator:</b> Allowance for the use of fishmeal and fish oil in tilapia feed containing products from fisheries that are listed on the IUCN's Red List or the species list maintained by the Convention on the International Trade of Endangered Species of Wild Fauna and Flora</p> <p><b>Requirement:</b> None</p> <p><b>Applicability:</b> All Farms, Unit of Certification Only</p>	a. Obtain a signed letter from feed manufacturer identifying the origin (genus, species and region harvested) of fish used in fish meal/oil (Audit Reference 9).	A. Verify that species used in fishmeal are identified in a letter from the feed manufacturer.
		b. Determine if any of the species used in fish feed are on the IUCN's Red List following the instructions given for Indicator 4.4.2.	B. Repeat search of IUCN database to verify that client obtained an accurate result.
		c. Determine if any of the species used in fish feed are listed by CITES as follows: - go to <a href="http://www.cites.org/eng/resources/species.html">http://www.cites.org/eng/resources/species.html</a> - select option "Species" and click "find it"	C. Repeat search of CITES database to verify that client obtained an accurate result.
5.1.3	<p><b>Indicator:</b> Timeframe for producers to source feed containing fishmeal or fish oil originating from fisheries deemed sustainable by an ISEAL member's accredited certification scheme</p> <p><b>Requirement:</b> 5 years following the date of ISRTA publication</p> <p><b>Applicability:</b> All Farms, Unit of Certification Only</p>	a. Prepare a policy stating the organization's support of efforts to shift feed manufacturers to an ISEAL-accredited certification scheme for fish meal/oil origins.	A. Verify that the client's policy supports sustainable feed sourcing (e.g. programs at <a href="http://www.isealliance.org/portrait/full%20member">http://www.isealliance.org/portrait/full%20member</a> ).
		b. Prepare a letter stating the organization's intent to source feed containing fishmeal or fish oil originating from fisheries deemed sustainable by an ISEAL member's accredited certification scheme by 19 December 2014.	B. Obtain a copy of client's letter of intent.
		c. Affirm support of the process through internal and external communications (e.g. correspondence with feed manufacturers).	C. Confirm client's support with documented evidence (letters, communications).
5.1.4	<p><b>Indicator:</b> Prior to achievement of 5.1.3, the average FishSource score characterizing the fishery(ies) from which the fishmeal or fish oil is derived. See Appendix V for explanation of FishSource scoring.</p> <p><b>Requirement:</b> ≥ 6.0 with no individual score &lt; 6.0 or an N/A in the stock assessment category</p> <p><b>Applicability:</b> All Farms, Unit of Certification Only</p>	<p><b>Instructions to Clients for Indicator 5.1.4 - FishSource Scores of Feed Species</b> For species from which fishmeal or fish oil is derived, determine FishSource scores as follows: - go to <a href="http://www.fishsource.org/">http://www.fishsource.org/</a> - select "Species" drop down tab to the left and enter relevant species - select the top tab that reads "Scores"</p>	
		a. Record FishSource scores for each species from which fishmeal or fish oil is derived.	A. Confirm that client has recorded scores for each species. Repeat FishSource analysis to verify that client obtained an accurate result.
		b. Confirm that average score is ≥ 6.0 with no individual score < 6.0.	B. If any scores is < 6.0 then the feed does not comply with the Requirement. If the average score is < 6.0 then the feed does not comply with the Requirement.
		c. Confirm that there is no 'N/A' in a stock assessment category.	C. If an 'N/A' appears in the sock assessment category then the feed does not comply with the Requirement.
		d. If the species is not on the website it means that a FishSource assessment is not available. Contact FishSource via Sustainable Fisheries Partnerships to identify the species as a priority for assessment.	D. If the species does not have a FishSource score then the fish feed does not comply with the Requirement.
		e. In lieu of FishSource scores, a farm undergoing a first audit may substitute a signed letter of intent from their feed manufacturer stating commitment to provide feed complying with FishSource scoring requirements. However at the second audit, all farms shall demonstrate that they have used feed that complies with the FishSource scoring requirements for a minimum of 6 months.	E. Verify that client has manufacturer's letter of intent as applicable to first audits. Thereafter, client must demonstrate that all feeds used are in compliance with the Requirement.

Criteria 5.2 Criteria: Preference for better feed manufacturers		Compliance Criteria (Required Client Actions):	Auditor Evaluation (Required CB Actions):
5.2.1	<p><b>Indicator:</b> Timeframe for producers to provide evidence of preferential sourcing of feed products from feed manufacturers that have a sustainable sourcing policy for feed ingredients, and traceability of feed ingredients</p> <p><b>Requirement:</b> 2 years following the date that the ISRTA are published</p> <p><b>Applicability:</b> All Farms, Unit of Certification Only</p>	a. Compile a list of all feed suppliers with contact information.	A. Review feed supplier list and cross-check against feed purchases.
		b. Prepare a letter of intent to preferentially source feed from suppliers who have a traceability and sustainability policy by 19 December 2011 (Audit Reference 9; also see Indicator 5.1.3B).	B. Verify that client has prepared the letter (it must cover traceability; see Indicator 5.1.3B).
		c. Communicate your organization's policy to each feed supplier.	C. Verify that client communicated policy to feed supplier.
		d. Request a traceability policy from each feed supplier (or letter of intent to establish one) before 19 December 2011.	D. Verify client requested documents from each supplier.
		e. Request sustainability policy from each feed supplier (or letter of intent to establish one) before 19 December 2011.	E. Verify client requested documents from each supplier. Auditors shall allow clients one year (until 19 December 2012) to demonstrate full compliance with 5.2.1c-e in accordance with forthcoming ASC guidelines.
5.3 Criteria: Energy use		Compliance Criteria (Required Client Actions):	Auditor Evaluation (Required CB Actions):
5.3.1	<p><b>Indicator:</b> Identification of the energy sources and calculation and verification of total energy used at the culture facility</p> <p><b>Requirement:</b> Measured in kilojoules/mt fish/year</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p><b>Instructions to Clients for Indicator 5.3.1 - Calculating Total Energy used by Farm</b></p> <p>Calculate the total energy consumption of the farm over the prior 12-month period by completing the Energy Budget Worksheet (Audit Reference 10). Include all sources of energy consumption on the farm site such as aeration, boat engines, electricity for housing, etc. Do not include off-site energy consumption such as transport of personnel to or from the farm, or transport of fish to or from the farm. Report energy consumption in kilojoules (Note: 1 megajoule = 1,000 kilojoules). The different energy units can be converted to kilojoules using the following website: <a href="http://tonto.eia.doe.gov/energyexplained/index.cfm?page=about">http://tonto.eia.doe.gov/energyexplained/index.cfm?page=about</a>. Report the grand total energy used as kilojoules/mt fish produced/year.</p>	
		a. Complete the Energy Budget Worksheet (Audit Reference 10).	A. Verify that client completed the Energy Budget Worksheet.
PRINCIPLE 6. MANAGE FISH HEALTH AND WELFARE IN AN ENVIRONMENTALLY RESPONSIBLE MANNER			
6.1 Criteria: Stocked tilapia recovery			
6.1.1	<p><b>Indicator:</b> Percent recovery of fish stocked in production stages after they have attained a size of 100 grams</p> <p><b>Requirement:</b> ≥ 65</p> <p><b>Applicability:</b> All Farms, Unit of Certification Only</p>	<p><b>Instructions to Clients for Indicator 6.1.1 - Calculating Percent Recovery of Production Stages</b></p> <p>Calculate the annual percent recovery of fish stocked in production stages after they have attained a size of 100 grams. All steps refer to quantities for the entire preceding 12-month period.</p> <ol style="list-style-type: none"> <li>1) Stage of production where fish attain an average weight of 100 g (estimated) identified.</li> <li>2) Estimated loss of fish (#) prior to average size of 100 g being achieved for all production cycles (in ponds, cages, tanks, etc.) for the prior 12-month period.</li> <li>3) Standing stock of fish (#) after average size of 100 g achieved.</li> <li>4) The number of fish harvested to market for the 12 month period divided by (#3 above) multiplied by 100 is equal to the percent recovery after 100 g.</li> <li>5) Average percent recovery for prior 12-month period at grow-out site and verification of calculations from farm records.</li> </ol> <p>Note 1: The method presented above is the required formula for calculating annual percent recovery of fish stocked in production stages. It is acknowledged that some farms may have production cycles which make it difficult to accurately collect the information needed to complete this calculation. In such cases, the client may propose to modify the abovementioned formula provided that the client can show such change is justified. Written justification shall be submitted to the CB together with a detailed description of farm production cycles and a complete explanation showing how a modified formula will yield a more accurate calculation of annual percent recovery of fish stocked in production stages. Proposals must be reviewed and approved by the CB before the audit.</p> <p>Note 2: Recovery does not include recruitment of tilapia resulting from reproduction within the culture system.</p>	

		a. Collect 12 months of data on recovery before the first audit.	A. Make sure client has collected 12 months of data on recovery before first audit.
		b. If the farm proposes to modify the formula for calculating percent recovery, submit written justification to the CB before the first audit.	B. Review justification for using an alternate calculation if applicable.
		c. Calculate percent recovery according to the instructions above.	C. Review calculations and verify that client's production records support the conclusions.
		-	D. Verify that percent recovery complies with Requirement.
<b>6.2 Criteria: Chemicals</b>		<b>Compliance Criteria (Required Client Actions):</b>	<b>Auditor Evaluation (Required CB Actions):</b>
6.2.1	<p><b>Indicator:</b> Allowance for the use of chemicals and therapeutants for disease and pest control that are banned in the importing or producing country</p> <p><b>Requirement:</b> None</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. Prepare a list of all chemicals used on the farm in the previous 12 months. [Note: The TAD considers any substance added by the producer to culture system - aside from water and feed - to be a chemical.]	A. Review list. Cross-check against purchases (6.2.2) and health events (6.2.4).
		b. Prepare a list of suppliers of all chemicals or therapeutants used.	B. Review supplier list to identify the country of origin for each chemical.
		c. Prepare a list of all the countries where the product has been exported to in the prior 12-month period.	C. Review list and cross-check against documentary evidence (e.g. sales documents).
		d. Prepare a list of banned substances for the producing and exporting country and the national authority or regulating body in producing country (contact information required).	D. Review evidence and cross-check against published information.
		e. Maintain records of voluntary and/or mandatory chemical residue testing conducted or commissioned by the farm from prior 12-month period.	E. Verify records.
6.2.2	<p><b>Indicator:</b> Allowance for the prophylactic use of antibiotics, prior to any evidence of a disease problem</p> <p><b>Requirement:</b> None</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. Maintain records for all purchases of antibiotics (invoices, prescriptions) .	A. Review purchase records and calculate total amount procured by client. Inspect storage area to verify quantities on site.
		b. Maintain a log of all health related events. For each event record the duration and the requirements for use of antibiotics or therapeutants (see also 6.2.4).	B. Review log of health events to verify that the quantity of antibiotic applied by the client does not suggest prophylactic use.
		c. Determine the total amount of antibiotics used in prior 12-month period.	C. Verify total amount of antibiotics used is equal to total amount prescribed.

6.2.3	<p><b>Indicator:</b> Minimum hold time required before any water in which fish have been fed with feed containing methyl or ethyl testosterone can be released</p> <p><b>Requirement:</b> ≥ 48 hours</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p><i>This indicator applies only to farms where the hatchery is located at the grow-out site (e.g. the grow-out facility owns and operates the hatchery) and where the hatchery discharges into the receiving waters. During the holding period, there shall be no risk of exposure of humans or livestock to methyl or ethyl testosterone.</i></p>			
		a. Hatchery facility must have the capacity to retain any water that contains hormones for sex reversal for a period of ≥ 48 hours .	A. Inspect hatchery to verify effectiveness of the systems to retain any water that contains hormones for sex reversal.		
6.2.4	<p><b>Indicator:</b> Health records proving all therapeutants were used or are being used as prescribed by a veterinary or accredited fish health professional</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. Keep a record of all therapeutants used for prior 12-month period.	A. Review record of therapeutant usage.		
		b. Maintain all prescriptions for therapeutants for prior 12-month period.	B. Verify that therapeutants were used only under prescription.		
		c. If prescriptions are made by health professionals who are not veterinarians, obtain evidence of competency (e.g. accreditation) in the diagnosis of fish disease and drug therapy.	C. If a non-vetrenarian wrote prescriptions, confirm that the individual is qualified as an accredited fish health professional.		
6.2.5	<p><b>Indicator:</b> Calculation and verification of the total amount of each antibiotic (active ingredient) used per mt fish produced per year.</p> <p><b>Requirement:</b> Measured in kilograms of active ingredient of individual antibiotic/mt of fish produced/year</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. Determine total amount of antibiotic used for prior 12-month period.	A. Verify against record of antibiotic use (see 6.2.2C).		
		b. Adjust total weight of antibiotic by the fraction of active ingredient.	B. Verify fraction of active ingredient in antibiotic with manufacturer's data.		
		c. Determine total weight of fish produced for prior 12-month period. Calculate kg active ingredient/mt of fish produced/year.	C. Verify that calculations are accurate.		
<b>6.3 Criteria: Mortalities</b>		<b>Compliance Criteria (Required Client Actions):</b>		<b>Auditor Evaluation (Required CB Actions):</b>	
6.3.1	<p><b>Indicator:</b> Presence of records demonstrating that fish mortalities are removed consistently on a minimum daily basis</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Unit of Certification Only</p>	a. Ensure that fish mortalities are removed from cultures on a daily basis.	A. Do site inspection to confirm there are no dead fish in cultures whose advanced state of decomposition would suggest mortality is > 1 day.		
		b. Maintain records of daily removals of fish mortalities.	B. Verify client's records show daily removals of fish mortality for prior 12-month period.		
6.3.2	<p><b>Indicator:</b> Evidence proving acceptable disposal of dead fish, (i.e., landfill receiving receipts, sales receipts, permits or approvals for onsite burial, and assurance if converted to animal meals not destined for the culture of tilapia)</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. Prepare a farm policy that addresses all requirements of the Standard in regards to the acceptable disposal of dead fish.	A. Review policy to verify it addresses all requirements of 6.3.2 of the Standard.		
		b. Maintain records of mortality disposals as evidence of compliance.	B. Review disposal records to verify compliance.		
		-	C. Do site inspection to confirm that farm policy towards mortality is implemented and mortality records are accurate.		



6.4 Criteria: Fish health management		Compliance Criteria (Required Client Actions):	Auditor Evaluation (Required CB Actions):
6.4.1	<p><b>Indicator:</b> Presence and evidence of implementation of a fish health plan that is site-specific and contains effective methods for 1) Protecting the farm from introduction of pathogens, 2) Preventing the spread of pathogens within the farm and to the receiving waters and 3) Reducing the potential for development of disease resistance by ensuring responsible therapeutant use</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. Prepare a fish health plan that addresses all requirements of the Standard, including:</p> <ol style="list-style-type: none"> <li>1) Protecting the farm from introduction of pathogens,</li> <li>2) Preventing the spread of pathogens within the farm and to the receiving waters, and</li> <li>3) Reducing the potential for development of disease resistance by ensuring responsible therapeutant use</li> </ol>	A. Review fish health plan to verify it addresses all requirements of Indicator 6.4.1 of the Standard and that the plan is site-specific.
		<p>b. Obtain review and written approval of the fish health plan by the farm's veterinarian or health professional.</p>	B. Confirm that the farm's veterinarian or health professional has reviewed and approved the fish health plan.
		-	C. Do site inspection to verify that fish health plan is effectively implemented and understood by farm staff.

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**Social requirements of this Standard shall be audited by an individual who is a lead auditor in conformity with SAAS Procedure 200 section 3.1.  
(See ASC Farm Certification and Accreditation Requirements)**

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**PRINCIPLE 7. BE SOCIALLY RESPONSIBLE**

7.1 Criteria: Child labor		Compliance Criteria:
7.1.1	<p><b>Indicator:</b> Number of incidences of child<sup>[8]</sup> labor<sup>[9]</sup></p> <p><b>Requirement:</b> 0 (zero)</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<ol style="list-style-type: none"> <li>a. Minimum age of permanent workers is 15 or older (per national legal minimum age).</li> <li>b. System exists to monitor hours and conditions of young workers and light work by children.</li> <li>c. Young workers (from 15 to less than 18): have no conflicts between work and schooling; do not spend more than 10 hours/day on transportation time, school and work; do not perform hazardous work.</li> <li>d. Equal treatment for children of migrant workers.</li> </ol>
Footnote	<sup>[8]</sup> A "child" is defined as any person less than 15 years of age. A higher age would apply if the minimum age law stipulates a higher age for work or mandatory schooling. If, however, the local minimum age law is set at 14, in accordance with developing country exceptions under ILO Convention 138, the lower age will apply.	
Footnote 10	<sup>[9]</sup> "Child labor" is defined as any work by a child younger than the age specified in the definition of a child, except for light work as provided for by ILO Convention 138, article 7.	
7.2 Criteria: Forced, bonded, compulsory labor		Compliance Criteria:
7.2.1	<p><b>Indicator:</b> Number of incidences of forced<sup>[10]</sup>, bonded<sup>[11]</sup> or compulsory labor</p> <p><b>Requirement:</b> 0 (zero)</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<ol style="list-style-type: none"> <li>a. Contracts clearly stated and understood by employees, no 'pay to work' schemes through labor contractors or training credit programs.</li> <li>b. Employees free to leave workplace and manage their own time.</li> <li>c. Employer does not withhold employee's original identity papers.</li> <li>d. Employer shall not withhold any part of workers' salaries, benefits, property or documents in order to oblige them to continue working for employer.</li> <li>e. Employees not to be obligated to stay in job to repay debt.</li> </ol>
Footnote	<sup>[10]</sup> "Forced (compulsory) labor" is defined as all work or service that is extracted from any person under the menace of any penalty for which a person has not offered him/ herself voluntarily or for which such work or service is demanded as a repayment of debt. "Penalty" can imply monetary sanctions, physical punishment, or the loss of rights and privileges or restriction of movement (e.g., withholding of identity documents).	
Footnote	<sup>[11]</sup> "Bonded labor" is defined as when a person is forced by the employer or creditor to work to repay a financial debt to the crediting agency.	

7.3 Criteria: Discrimination in the work environment		Compliance Criteria:
7.3.1	<p><b>Indicator:</b> Number of incidences of discrimination<sup>[12]</sup></p> <p><b>Requirement:</b> 0 (zero)</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. Written anti-discrimination policies in place, stating that the company does not engage/support in 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.</p> <p>b. Worker testimony supports 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. Records indicate objective mechanisms for employee reviews and the offering of promotion and training opportunities.</p> <p>c. Company has a policy in place protecting pregnant and lactating mothers.</p> <p>d. Company has a policy in place against HIV discrimination.</p>
Footnote	<p><sup>[12]</sup> "Discrimination" is defined as 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.</p>	
7.3.2	<p><b>Indicator:</b> Evidence of proactive anti-discrimination practice</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. Verification of clear and transparent company procedures are outlined to raise, file, and respond to discrimination complaints.</p> <p>b. All managers and supervisors receive training on diversity and non-discrimination. All personnel receive non-discrimination training. Internal or external training acceptable if proven effective.</p> <p>c. Comparison of workforce diversity with demographics of host community updated regularly by management.</p>
7.4 Criteria: Health and safety of workers		Compliance Criteria:
7.4.1	<p><b>Indicator:</b> Percentage of workers trained in health and safety practices/ procedures/ policies</p> <p><b>Requirement:</b> 100 %</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. 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 employees.</p> <p>b. Emergency response procedures shall exist and be known by employees.</p> <p>c. Health and safety training for all employees conducted on a regular basis (once a year and immediately for all new employees), including training on potential hazards and risk minimization.</p> <p>d. Potentially dangerous chemicals are stored properly and as prescribed.</p>
7.4.2	<p><b>Indicator:</b> Percentage of health- and safety-related accidents and violations recorded and mitigated through corrective actions</p> <p><b>Requirement:</b> 100 %</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. Documentation is generated with regards to occupational health and safety violations.</p> <p>b. Corrective action plan are implemented in response to accidents that have occurred. This should include: analysis of the root causes, address the root causes, remediate and prevent future accidents of similar nature.</p> <p>c. Workers involved in departments where accidents have occurred can explain what analysis has been done and what steps taken/improvements made.</p>
7.4.3	<p><b>Indicator:</b> Employer responsibility and proof of insurance (accident/ injury) for employee costs in a job-related accident or injury when not covered under national law</p> <p><b>Requirement:</b> 100 %</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. Documentation maintained by management confirms that all personnel are provided sufficient insurance to cover annual check-ups and costs related to occupational accidents or injuries. Equal insurance coverage must include temporary, migrant or foreign workers.</p>

7.5 Criteria: Wages, overtime and working hours		Compliance Criteria:
7.5.1	<p><b>Indicator:</b> The percentage of employees who are paid fair and decent wages</p> <p><b>Requirement:</b> 100 %</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p><i>Applicable to employees, workers and contractors</i></p> <p>a. Employers/Managers understand and have policies to ensure the principle of equal pay for equal work.</p> <p>b. Employers ensure wages paid for a standard working week (no more than 48 hours) always meet, at least, legal/industry minimum standards, cover basic needs of personnel and provide some discretionary income.</p> <p>c. Labor conflict resolution policy in place to track conflicts &amp; complaints raised, and responses to conflicts &amp; complaints.</p> <p>d. Ratio of lowest wage rate to basic needs wage always exceeds 100%.</p> <p>e. Proof of employer engagement with workers and their representative organizations, and use of cost of living assessments from credible sources to assess basic needs wages.</p>
7.5.2	<p><b>Indicator:</b> Incidences of abuse of working hours and/or overtime laws</p> <p><b>Requirement:</b> 0 (zero)</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. No deductions in pay for disciplinary actions.</p> <p>b. Wage and benefits are clearly articulated to employees and rendered to employees in a convenient manner; e.g. no need to travel to collect benefits, no promissory notes, coupons or merchandise; payment in cash or check.</p> <p>c. Labor-only contracting<sup>[13]</sup> or false apprenticeship schemes<sup>[14]</sup> are not accepted, including: revolving/consecutive labor contracts used to deny benefit accrual.</p> <p>d. Clear, transparent mechanism for wage setting known to employees.</p> <p>e. Employer shall comply with applicable laws and industry standards related to working hours. "Normal workweek" can be defined by law but shall not on a regular basis (constantly of majority of the time) exceed 48 hours. Only if allowed by law, variations (to the 48-hour regular work week) based on seasonality may apply.</p> <p>f. Personnel shall be provided with at least one day off in every seven day period.</p> <p>g. All overtime shall be paid at a premium and should not exceed 12 hours per week.</p> <p>h. Overtime work shall always be voluntary.</p>
Footnote	<sup>[13]</sup> 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	
Footnote	<sup>[14]</sup> 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.	
7.6 Criteria: Freedom of association and right to collective bargaining		Compliance Criteria:
7.6.1	<p><b>Indicator:</b> Incidences of employees denied freedom to associate, ability to bargain collectively<sup>[15]</sup> or denied access to representative(s) chosen by workers</p> <p><b>Requirement:</b> 0 (zero)</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. Workers have the freedom to form and join any trade union, free of any form of interference from employers or competing organizations set up or backed by the employer. ILO specifically prohibits "acts which are designated to promote the establishment of worker organizations or to support worker organizations under the control or employers or employers' organizations.</p> <p>b. Local trade union, or where none exists a reputable civil-society organization, confirms no outstanding cases against the employer for violations of employees' freedom of association and collective bargaining rights.</p> <p>c. Trade union representatives have access to their members in the workplace at reasonable times on the premises.</p> <p>d. Explicit communications from the employer about their commitment to freedom of association and collective bargaining rights of all.</p> <p>e. If trade unions exist, they are able to access/inform all workers directly (posters, pamphlets, visits).</p>
Footnote	<sup>[15]</sup> "Bargain collectively" is defined as a voluntary negotiation between employers and organizations of workers in order to establish the terms and conditions of employment by means of collective (written) agreements.	
7.7 Criteria: Disciplinary Actions		Compliance Criteria:
7.7.1	<p><b>Indicator:</b> Incidences of abusive disciplinary actions</p> <p><b>Requirement:</b> 0 (zero)</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. There is never any use of or support for (e.g. subcontractors using) corporal punishment, mental or physical coercion, or verbal abuse.</p> <p>b. Fines or wage deductions shall not be acceptable as a method for disciplining workers (indicated by policy statements, as well as evidence from worker testimony).</p>

7.7.2	<p><b>Indicator:</b> Evidence of non-abusive disciplinary policies and procedures</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. Procedures exist for situations in which disciplinary action is required, and they establish the use of progressive verbal and written warnings. Aim should always be to improve the worker before letting him/her go (indicated by policy statements as well as evidence from worker testimony).</p>
7.8 Criteria: Action response plans/policies		<b>Compliance Criteria:</b>
7.8.1	<p><b>Indicator:</b> Evidence of implementation of a corrective action plan (updated annually) that addresses unintended problems associated with labor relations and internal monitoring of labor activities</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. Copy of corrective action plan for prior 12-month period (first audit requires previous 3-month period) and employer testimonial that these plans have been implemented.</p> <p>b. Workers are aware of the action plans and their results.</p>
7.8.2	<p><b>Indicator:</b> Evidence of implementation of an emergency action plan and annual (or more frequent) internal monitoring activities</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. Copy of emergency (examples include earthquakes, fires, storms, etc.) action plan for prior 12-month period (first audit requires previous 3-month period) and employer testimonial that these plans have been implemented.</p> <p>b. Worker competency in the appropriate actions required during an emergency response.</p>
7.8.3	<p><b>Indicator:</b> Evidence of implementation of a verifiable conflict resolution policy for conflicts and complaints tracked transparently, and proof that conflicts and complaints from employees are responded to within three months after being received</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. Copy of conflict resolution policy for prior 12-month period (first audit requires previous 3-month period) and employer testimonial that this plan has been implemented.</p> <p>b. Three month time-frame from employee conflict filing and response upheld.</p> <p>c. Records of complaint cases, related actions and resolution maintained as well as worker evaluation of the resolution.</p> <p>d. Worker actions and testimony confirms they understand this process and are comfortable raising complaints.</p>
7.9 Criteria: Living conditions for employees		<b>Compliance Criteria:</b>
7.9.1	<p><b>Indicator:</b> Evidence that living conditions are clean, sanitary and safe for habitation</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. Evidence that potable/safe drinking water available.</p> <p>b. Evidence that sanitary conditions for disposal of human waste are in practice.</p> <p>c. Evidence that human waste is not discharged into the environment.</p> <p>d. Employee housing is constructed of material to sustain local conditions in the event of storms or other natural events that could endanger lives.</p>

7.10 Criteria: Community relations and interaction		Compliance Criteria:
7.10.1	<p><b>Indicator:</b> Evidence that farms are not inhibiting or restricting local community access to public land, freshwater resources or public fishing grounds</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	a. Testimonials from surrounding community members that farms have not blocked access to public property or public natural resources.
7.10.2	<p><b>Indicator:</b> Evidence of implementation of a verifiable conflict resolution policy for conflicts and complaints tracked transparently, and proof that conflicts and complaints from communities are responded to within three months after being received</p> <p><b>Requirement:</b> Yes</p> <p><b>Applicability:</b> All Farms, Farm-Wide</p>	<p>a. Verification of community conflict resolution policy and actions for prior 12-month period (first audit requires previous 3-month period) and community testimonials that this plan has been implemented and there is a shared understanding of procedures for filing complaints.</p> <p>b. Three month time-frame from community member conflict filing and response evidenced by community testimonials.</p> <p>c. Verification that farm management communicates with the community on the impact of its activities.</p> <p>d. If environmental impact assessment has been performed, it is made easily accessible to community members.</p> <p>e. If a socio-economic impact assessment has been performed, it is made easily accessible to community members.</p> <p>f. Economic impacts of the farm activities reported – at least annually – to the community.</p>

**Audit Reference 1: Equipment and methods for the ASC Tilapia Standard**

	<b>Equipment</b>	<b>Acceptable Method</b>	<b>Responsible Party</b>
<b>1</b>	At least three 1-liter plastic water sampling bottles	NA	Farm
<b>2</b>	Boat equipped to maneuver to sampling locations within 1 hour	NA	Farm
<b>3</b>	Cast net for ponds or raceways	NA	Farm
<b>4</b>	Conductivity meter (precision to 1 uS/cm)	ISO 7888:1985 or equivalent *	Farm and Auditor
<b>5</b>	Cooler to contain water sampling bottles	NA	Farm
<b>6</b>	Dip nets for cages or recirculating aquaculture systems	NA	Farm
<b>7</b>	Dissolved oxygen meter (precision : 0.1 mg/L)	ISO 5814:1990 or equivalent *	Farm and Auditor
<b>8</b>	Dye for sexing fish	NA	Farm and Auditor
<b>9</b>	Global Positioning System (GPS)	NA	Farm and Auditor
<b>10</b>	Ice or dry ice for sample preservation	NA	Farm
<b>11</b>	Nephelometer (precision 5 NTUs)	ISO 7027:1999c or equivalent *	Farm and Auditor
<b>12</b>	No mandatory equipment, but chlorophyll <u>a</u> is required and if farms are not equipped to analyze, laboratories are necessary	ISO 10260:1992 or equivalent *	Farm and Auditor
<b>13</b>	No mandatory equipment, but dissolved phosphate phosphorus is required and if farms are not equipped to analyze, laboratories are necessary (precision 10 ug/L)	ISO 6878:2004 or equivalent *	Farm and Auditor
<b>14</b>	No mandatory equipment, but total ammonia nitrogen is required and if farms are not equipped to analyze, laboratories are necessary (precision 20 ug/L)	ISO 7150-1:1984 or equivalent *	Farm and Auditor
<b>15</b>	No mandatory equipment, but total phosphorus is required and if farms are not equipped to analyze, laboratories are necessary (precision 10 ug/L)	ISO 6878:2004 or equivalent *	Farm and Auditor
<b>16</b>	Secchi disk with contrasting black and white segments (precision: 1 cm)	ISO 7027:1999b or equivalent *	Farm and Auditor
<b>17</b>	Thermometer (no mercury thermometers) (precision:0.1 degree Celsius)	NA	Farm and Auditor
<i>*Methods that result in analyzed data values within 5% error of ISO standards are allowable.</i>			

**Audit Reference 2:** Receiving Water Information Checklist and evaluation for grow-out site (Standard 2.1.1) to be provided to CB.

	<b>Information</b>	<b>Validation</b>	<b>Present/Absent (V or X)</b>
<b>1</b>	Dates of farm establishment and expansion	dd/mm/yyyy	
<b>2</b>	Size of farm operation being audited (hectares)	ha	
<b>3</b>	GPS Coordinates of farm being audited	List coordinates (minimum of 2sets of coordinates on farm)	
<b>4</b>	Satellite imagery of farm	Attach satellite images	
<b>5</b>	Schematic of farm with specific locations of all water inlets and outfalls	Attach schematic	
<b>6</b>	Receiving water system type (riverine, estuarine, etc.)	Specify	
<b>7</b>	Official national government certification that the tilapia species being cultured was established on or before 1 January 2008. In Africa, in the native range of tilapia species, cultured species and strain must be shown to have been recruited from the same population as that existing in the receiving waters on or before 1 January 2008.	List and attach copies of these studies or evidence	
<b>8</b>	Major characterization studies (excluding EIAs, see below) conducted pertaining to the receiving waters or specific activities conducted on the receiving watershed, if any (published or non published)	List and attach copies of these studies	
<b>9</b>	Description of the major activities (beyond your operation) impinging on the receiving watershed.	List and attach copies explaining activities	
<b>10</b>	Environmental Impact Assessment(s) for initial farm siting and for expansion	Attach documents	
<b>11</b>	Other pertinent information regarding the receiving waters and any effect of farm activities	Attach documents	
<b>12</b>	Stewardship activities to protect the receiving watershed from pollution	List or attach copies explaining in detail stewardship activities	

**Audit Reference 3:** Quick guide for water quality monitoring requirements in receiving waters of grow-out site (Standard 2.5.1) and identification of applicable standards at RWFA sampling site.

	<b>Required for Monitoring<sup>1</sup> for all farms at RWRP, RWFO, RWFA</b> (during 6 months, once per month minimum)	<b>Subject to Standard at RWFA only</b>
<b>Receiving Water System</b> (Estuary, lake, etc.)	Type (estuary, river, lake, etc.)	NA
<b>Dissolved oxygen (mg/L)</b>	Yes	No
<b>Discharge volume<sup>5</sup>/Residence time (See Audit Reference 6)</b>	Yes for farm or receiving water body	No
<b>Turbidity(NTU)</b>	Yes	No
<b>Specific conductance(μS/cm)</b>	Yes	No
<b>Chlorophyll a (ug/L)</b>	Yes	Secchi-dependent <sup>2</sup> [Std 2.4.4]
<b>Secchi disk visibility (cm)</b>	Yes	Yes [Std 2.4.1 & 2.4.2]
<b>Dissolved phosphate-phosphorus (ug/L)</b>	Yes	No
<b>Ammonia-nitrogen (ug/L)</b>	Yes	No
<b>Diurnal Difference DO</b>	Only at RWFA	Yes [Std 2.3.2]
<b>Total Phosphorus</b>	No	Secchi-dependent <sup>2</sup> [Std 2.4.3]
<p><sup>1</sup> Farms established after 19 December 2009 require 12 months, not 6 months, of Diurnal Difference DO monitoring.</p> <p><sup>2</sup> If receiving waters have a Secchi disk visibility reading of less than 5.0 m, but annual average is greater than 5.0 m, this measurement is required and corresponding standards are enforced. If receiving waters have a Secchi disk visibility reading greater than 5.0 m and less than 10.0 m but annual average is greater than 5.0 m, this measurement is required but no standard is enforced unless Secchi reading annual average falls below 5.0 m in the future. Annual average from farm data is accepted if auditor inspection shows that Secchi disk reading is within 5% of farm data minimum and maximum Secchi disk readings.</p>		





dd/mm/yyyy hh:mm	RWRP										
dd/mm/yyyy hh:mm	RWFO										
dd/mm/yyyy hh:mm	RWFA										
dd/mm/yyyy hh:mm	RWRP										
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Average	RWRP										
Average	RWFO										
Average	RWFA										

\* Farms established after 19 December 2009 require 12 months, not 6 months, of Diurnal Difference DO monitoring.

**Audit Reference 5.** Solubility of dissolved oxygen in water at saturation as a function of temperature (°C) and salinity (ppt) and specific conductance (µS/cm) (Standard 2.3.1).

SC (µS/cm)	0	8850	16740	24300	31650	38860	45950	52950
Salinity (ppt)	0	5	10	15	20	25	30	35
Temp (°C)								
0	14.60	14.11	13.64	13.18	12.74	12.31	11.90	11.50
1	14.20	13.73	13.27	12.83	12.40	11.98	11.58	11.20
2	13.81	13.36	12.91	12.49	12.07	11.67	11.29	10.91
3	13.45	13.00	12.58	12.16	11.74	11.38	11.00	10.64
4	13.09	12.67	12.25	11.85	11.47	11.09	10.73	10.38
5	12.76	12.34	11.94	11.56	11.18	10.82	10.47	10.13
6	12.44	12.04	11.65	11.27	10.91	10.56	10.22	9.89
7	12.13	11.74	11.37	11.00	10.65	10.31	9.98	9.66
8	11.83	11.46	11.09	10.74	10.40	10.07	9.75	9.44
9	11.55	11.19	10.83	10.49	10.16	9.84	9.53	9.23
10	11.28	10.92	10.58	10.25	9.93	9.62	9.32	9.03
11	11.02	10.67	10.34	10.02	9.71	9.41	9.12	8.83
12	10.77	10.43	10.11	9.80	9.50	9.21	8.92	8.55
13	10.53	10.20	9.89	9.59	9.30	9.01	8.74	8.47
14	10.29	9.98	9.68	9.38	9.10	8.82	8.55	8.30
15	10.07	9.77	9.47	9.19	8.91	8.64	8.38	8.13
16	9.86	9.56	9.28	9.00	8.71	8.47	8.21	7.97
17	9.65	9.36	9.09	8.82	8.55	8.30	8.05	7.81
18	9.45	9.17	8.90	8.64	8.39	8.14	7.90	7.66
19	9.26	8.99	8.71	8.47	8.22	7.98	7.75	7.52
20	9.08	8.81	8.56	8.31	8.07	7.83	7.60	7.38
21	8.90	8.64	8.39	8.15	7.91	7.69	7.46	7.25
22	8.73	8.48	8.23	8.00	7.77	7.54	7.33	7.12
23	8.56	8.32	8.08	7.85	7.63	7.41	7.20	6.99
24	8.40	8.16	7.93	7.71	7.49	7.28	7.07	6.87
25	8.24	8.01	7.79	7.57	7.36	7.15	6.95	6.75
26	8.09	7.87	7.65	7.44	7.23	7.03	6.83	6.64
27	7.95	7.73	7.51	7.31	7.10	6.91	6.72	6.53
28	7.81	7.59	7.38	7.18	6.98	6.79	6.61	6.42
29	7.67	7.46	7.26	7.06	6.87	6.68	6.50	6.32
30	7.54	7.33	7.14	6.94	6.75	6.57	6.39	6.22
31	7.41	7.21	7.02	6.83	6.65	6.47	6.29	6.12
32	7.29	7.09	6.90	6.72	6.54	6.36	6.19	6.03
33	7.17	6.98	6.79	6.61	6.44	6.26	6.10	5.94
34	7.05	6.86	6.68	6.51	6.33	6.17	6.01	5.85
35	6.93	6.75	6.58	6.40	6.24	6.07	5.92	5.76
36	6.82	6.65	6.47	6.31	6.14	5.98	5.83	5.68
37	6.72	6.54	6.37	6.21	6.05	5.89	5.74	5.59
38	6.61	6.44	6.28	6.12	5.96	5.81	5.66	5.51
39	6.51	6.34	6.18	6.03	5.87	5.72	5.58	5.44
40	6.41	6.25	6.09	5.94	5.79	5.64	5.50	5.36

## Auditor Reference 6: Calculations

Equation 1. Calculation for Diurnal Difference in Dissolved Oxygen (DDDO) (Standard 2.3.1).

$$\text{DDDO} = \left[ \frac{\text{maximum dissolved oxygen (mg/L)}}{\text{tabulated dissolved oxygen at saturation}_{\text{max}} \text{ (mg/L)}} \times 100 \right] - \left[ \frac{\text{minimum dissolved oxygen (mg/L)}}{\text{tabulated dissolved oxygen at saturation}_{\text{min}} \text{ (mg/L)}} \times 100 \right]$$

Equation 1a. Conversion of specific conductance ( $\mu\text{S/cm}$ ) to salinity for determining the tabulated dissolved oxygen at saturation (Standard 2.3.1).

$$[\mu\text{S/cm} \div 1000]^{1.0878} \times 0.4665 \cong \text{Salinity (ppt)}$$

Equation 1b. Correcting the tabulated value of dissolved oxygen at saturation for elevation (Standard 2.3.1).

$$\text{DO}_{\text{AC}} = \text{DO}_{\text{Table}} \frac{\text{Site BP (mmHg)}}{760}$$

Equation 2. Calculation for determining percent error (accuracy) of farm data based on auditor data (Standards 2.5.1 and 3.2.1).

$$\text{Percent Error} = \frac{\text{Auditor Value} - \text{Farm Record Value}}{\text{Auditor Value}} \times 100$$

*Equation 3. Calculation for determining residence time for cage systems in lakes and reservoirs (Standard 2.5.1).*

$$\text{Residence Time} = \frac{\text{total water body volume}}{\text{water inflow/unit time}}$$

*Equation 4. Calculation for determining water discharge at land-based aquaculture facilities (Standard 2.5.1).*

$$\text{Water discharged per year} = \frac{\text{water discharged (m}^3\text{)}}{\text{year}}$$

*Equation 5. Calculation for determining percent error of farm values when using*

$$\text{Percent Error} = \frac{\text{Standard Methods Value} - \text{Farm Record Value}}{\text{Standard Method Value}} \times 100$$

*Equation 6. Calculation for the determination of total phosphorus released from the aquaculture activity (Standard 3.1.2).*

$$\text{Total P Input/mt} - 7.5 \text{ kg/mt} = \text{kg P/mt}$$

*Equation 7. Calculation for the determination of total nitrogen released from the aquaculture activity (Standard 3.1.4).*

$$\text{Total N Input/mt} - 21.2 \text{ kg/mt} = \text{kg N/mt}$$

*Equation 8. Fish production definition for calculations that request production over a prior 12-month period, Tilapia harvested and fingerlings stocked from off-site production are based on figures over the prior 12-month period. Off-site production is considered as fingerlings purchased from a hatchery not under ownership of the legal entity seeking certification of the production unit or hatchery owned by farm but not discharging into the receiving waters of the grow-out site.*

$$\text{Fish production} = (\text{Current standing stock of tilapia} + \text{tilapia harvested} - \text{initial standing stock}) - \text{fingerlings stocked from off-site production}$$

*Equation 9. Calculation for the economic feed conversion ratio (Standards 3.1.1 to 3.1.4 and 5.1.1).*

$$\text{eFCR} = \frac{\text{Total feed allotted to culture stock over 12 month period (mt)}}{\text{Fish production} * (\text{mt})}$$

*Equation 10. Calculation for the Feed Fish Equivalency Ratio. Use whichever equation that yields a higher value (Standard 5.1.1)*

$$\text{FFER}_m = \frac{(\% \text{ fish meal in feed}^{**}) \times (\text{eFCR})}{22.2} \quad \text{or} \quad \text{FFER}_o = \frac{(\% \text{ Fish oil in feed}) \times (\text{eFCR})}{5.0}$$

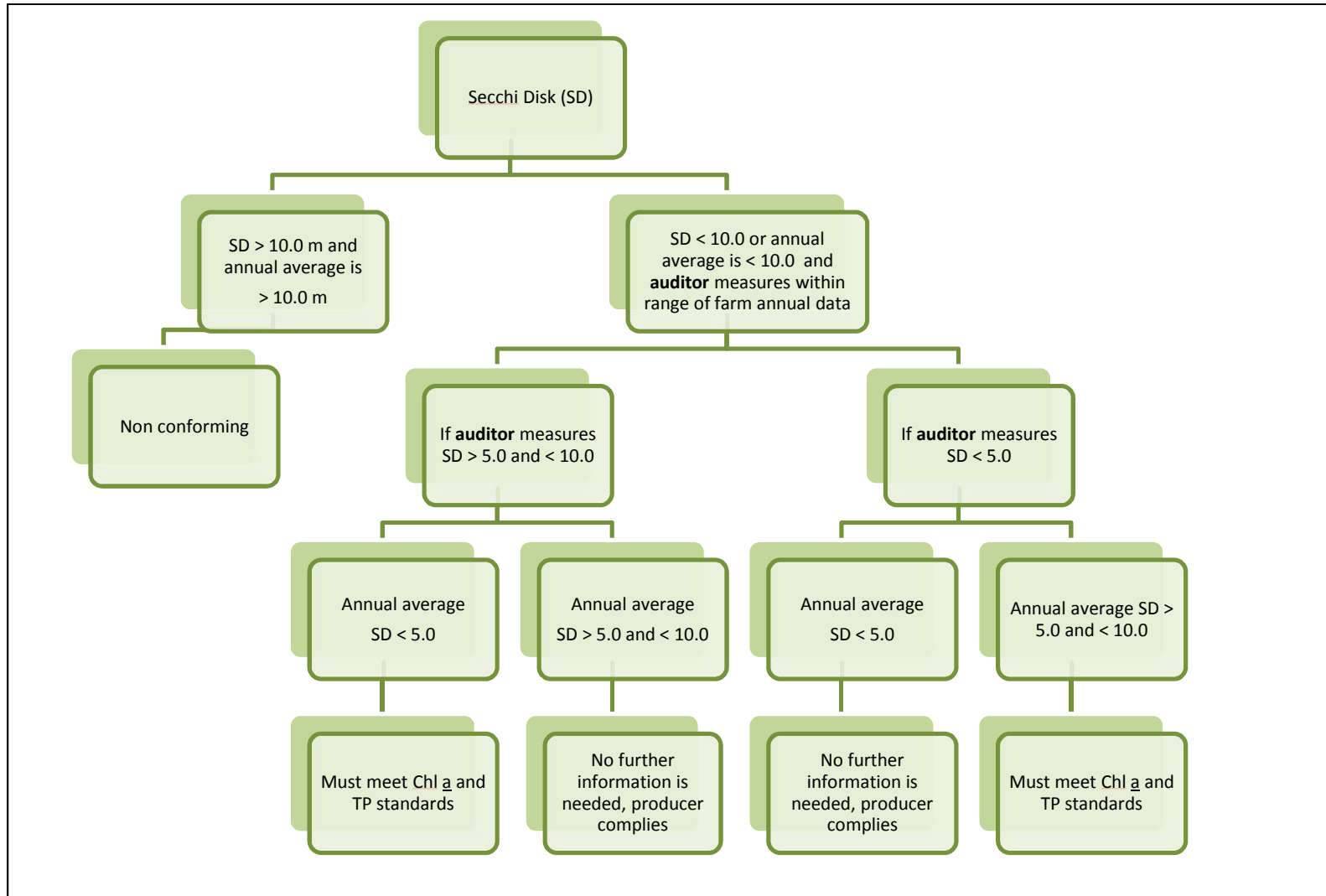
*Note: If multiple feed types are used, the following equation shall be used to account for the variability of fish meal inclusion in different feed types.*

$$\text{FFER}_{\text{sum}} = \frac{\sum [(\% \text{ fish meal in feed type}^{**}) \times (\text{mt of feed type used})]}{\text{Fish production} * (\text{mt}) \times 22.2}$$

\*See Equation 8 . for calculation

\*\* Whole number percent (if 7.0% fish meal inclusion in a feed type, use the whole number “7.0”)

**Audit Reference 7.** Flow chart for determining conformance with ASC Tilapia Standard oligotrophic receiving water standards (Standards 2.4.1 to 2.4.4)



**Audit Reference 8:** Nutrient budget worksheet for inputs and outputs of nutrients from farms (Standard 3.1.1 to 3.1.4)

		Percentile Fraction P	Percentile Fraction N	Total Input (kg) Prior 12 month	Total P In (kg)	Total N In (kg)
Feed A						
Fertilizer A						
Fertilizer B						
Other						
<b>Grand Total Input (GTI)</b>						
	Production Period	Fish Production Prior 12 mo* (mt)	P Removed at Harvest	N Removed at Harvest	Grand Total Out (GTO) P	Grand Total Out (GTO) N
	MM/YY to MM/YY	[Current standing stock** + fish harvested] – initial standing stock.....	7.5 X Fish Production (mt)	21.2 X Fish Production (mt)	GTI – P removed at harvest	GTI – N removed at harvest
<b>Total in/mt fish/yr</b>					GTI/mt fish produced /yr	GTI/mt fish produced /yr
<b>Total out/mt fish/yr</b>					GTO/mt fish produced /yr	GTO/mt fish produced /yr
<p><i>*Prior 12 month period – See Audit Reference 6, Equation 8.</i>  <i>** At time of audit</i></p>						



**Audit Reference 9:** Feed manufacturer information request worksheet for prior 12 month period. Contents of worksheet to be provided by feed manufacturer (independent lab analyses for nitrogen and phosphorus content in feed are acceptable). All information required. Sample language for letter to feed manufacturer provided below the table.

<b>Feed type(Enter manufacturer coding used on feed invoices)</b>					
<b>Total amount of feed purchased (mt)</b>					
<b>Total phosphorus content (% P)</b>					
<b>Total nitrogen content (% N)</b>					
<b>Total fish meal inclusion (% fish meal)</b>					
<b>Forage fish species utilized for fish meal and region harvested</b>					
<b>Total fish oil inclusion (% fish oil)</b>					
<b>Forage fish species utilized for fish oil and region harvested</b>					
<b>Antibiotic inclusion (% active ingredient)</b>					
<b>Feed manufacturer traceability policy</b>	<b>ATTACH COPY</b>				
<b>Feed manufacturer sustainability policy</b>	<b>ATTACH COPY</b>				

SAMPLE LANGUAGE FOR LETTER TO FEED MANUFACTURER

Dear

As part of [Company’s Name] commitment to responsible aquaculture production, we have chosen to pursue certification against the International Standards for Responsible Tilapia Aquaculture (ISRTA) created by the Tilapia Aquaculture Dialogue. One of the requirements of the ISRTA is to contact our feed manufacturer(s) to obtain data necessary to meet specific standards within the ISRTA. Please find attached a table indicating the data that I am requesting from [Feed Manufacturer Company’s Name] .

Additionally, for our farm(s) to remain certified, we must source feed that contains fish meal and oil from fisheries certified by and ISEAL-accredited scheme for sustainable fisheries before 19 December 2014. We request your efforts in assisting us in goal of maintaining certification and ensuring resources are used responsibly.

Your response to this request is also necessary to obtain our certification.

Thank you for your attention and cooperation.

Sincerely,

[Company’s Representative name and title]

**Audit Reference 10:** Energy budget worksheet (Standard 5.3.1)

Energy Type	Total used (prior 12-month period)	Total fish production (mt for prior 12-month period)	Total energy type used per mt of fish produced/prior 12-month period	Total energy used (kilojoules/mt fish produced/prior 12-month period)
Diesel				
Electricity				
Gasoline				
Other				
Other				
Other				
Other				
Other				
Other				
Other				
Other				
<b>Grand total energy used (kilojoules/mt fish produced/prior 12-month period)</b>				