Salmon Aquaculture Dialogue – Comments on Revised Draft Standards
July 2011

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Agrimarine Industries Inc.
Comments on the Salmon Aquaculture Dialogue Second Draft Standards for Responsible Salmon Aquaculture.

May 2011.

Comments:

1.0
2.1
The AZE is easily delineated under a net-pen array typically used in the salmon aquaculture industry. Solid-wall containment systems release only a small proportion of solid wastes and that as fine suspended particles that do not settle within the site boundaries. Similarly, dissolved wastes are carried beyond the site boundaries and circulated by ocean currents until assimilated by marine plants. While we are not very familiar with SEPA AUTODEPOMOD, available information indicates that this package primarily models solids deposition and degradation, and suggests a maximum sustainable site biomass and feed rate based on the assumption that all solids are released to the environment. We recommend that solid-wall containment vessels incorporating solids separation be exempted from a model or distance-based definition of AZE, and that redox and sulfide electrode potential measurements of sediments, together with the benthic impact indices listed on page 15, be the only measures required for determination of compliance by floating solid-wall containment systems.

2.2
This section also is based on the assumption of open net pens operating within a larger ocean lease. Solid-wall containment systems typically operate with supplemental oxygen and feedback-control systems. DO is maintained at a predetermined setpoint, so that variations in ambient DO and metabolic oxygen demand are accommodated through automatic adjustment of the oxygen delivery rate to the rearing enclosure. Similarly, measured or modeled nitrogen and phosphorous level in the discharge stream is maintained at a set level by varying water exchange rate. Although upset of the control system may occur occasionally, routine reporting of the setpoint may be considered unnecessary, and we suggest that an explanation of the system setpoints be submitted in lieu of water quality reports.

2.3
Aquaculture feed suppliers guarantee the proportion of fines as part of feed supply agreements. Feed is passed over a power screen prior to leaving the mill and breakage during transport is unlikely, so adherence to section 2.3.1 is therefore not difficult. The apparent assumption that only fines and fragments go uneaten, while all whole pellets are consumed within the net is, however, unsupportable. In solid-wall containment enclosures with standpipe discharges, discharge of uneaten pellets to the environment is prevented. Although variable-rate feed delivery and underwater video monitoring are

used, uneaten pellets are often found in the recovered solid waste stream. In open net-pens feed pellets fall through the net into the environment in a few seconds, unless eaten by the fish. In our experience, even the most careful observation of feeding behavior is insufficient to prevent escape of some proportion of the pellets, possibly as much as 2-3% as modern salmon farms use up to 10 tonnes of feed per day, release of even 1% as uneaten feed represents a significant and disruptive introduction of nutrient into the marine environment. We propose that instead of percentage fines, animal nutrient release should be quantified by observation of wildlife behavior in and around the aquaculture lease. Significant congregation of wild birds, fish, and marine mammals should be interpreted as an indicator of feed release, and corrected through installation of effective flow barriers.

2.4

2.5

Interaction with wildlife is encouraged by the presence of food and habitat. Food may be the feed pellets discharged from the rearing enclosures, fecal matter (in the case of detrital feeders), and farmed fish themselves, if visible (in the case of predators). Habitat is provided by high surface-area components such as nets. Lethal measures and acoustic deterrents can only partly mitigate these attractants. An effective solution can only involve effective removal of feces and uneaten feed from the discharge stream, and isolation of the farmed fish behind an opaque and odor-blocking barrier.

2.6

3.1

In AgriMarine's experience to date, no sea lice infestations have been found on Atlantic or pacific salmon species. This may indicate significant and possible reasons include deterrence of sea-lice attachment due to oxygen super saturation, and avoidance of motile life stages due to the increased depth of seawater intakes. We recommend that continuous high-resolution video monitoring, using a camera system capable of resolving life stages of attached sea-lice, be substituted for handling and manual inspection of fish, unless a significant infestation becomes apparent, and that monitoring of wild fish be avoided. Per footnote 27, weekly underwater video recordings should be acceptable as proof of sea-lice testing in solid-wall containment systems.

As we are unaware of any case where serious sea-lice amplification has occurred in farmed pacific salmon, we further recommend that pacific salmon be exempt from this criterion.

3.2

3.3

3.4

Some of this section is not relevant to solid-wall containment systems. Production planning includes routine inspection of equipment between production cycles. Composite and steel components are designed for service life of 20 years or more, and netting is used only for 'jump nets' and (flying) bird barriers. We recommend that solid-wall system be exempt from indicator 3.4.6.

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4.5

4.6
On-farm energy consumption is only one small part of the total energy and GHG impact incurred in delivering cultured fish to the consumer. The greatest potential energy / GHG benefit of solid-wall containment systems lies in their siting. Improved feed conversion ratio, reduced benthic impact and the ability to draw cool water from depth may allow producers to locate closer to markets, and avoid transportation of feed, fish, personnel, and supplies to and from remote sites. This criterion should be broadened to include impacts related to the entire supply chain, including all inputs such as feed, equipment, staff, harvest, processing, and transportation to market.

4.7
This criterion is not relevant to solid-wall containment systems that use mechanical cleaning methods, and should not apply to such.

5.1
5.2

5.3
As per criterion 3.1, reporting under this criterion should only be required when significant sea-lice infestation has been observed, and chemical therapeutants used. Non-persisting treatments such as oxygen and active-oxygen species should be exempt.

5.4
Solid-wall containment systems provide an effective bio-security barrier between adjacent enclosures at the same site, and should be exempt from this criterion 5.4.1. Surface bio security barriers including footbaths, equipment disinfection stations, and hand wash stations such as those used at other facilities where multiple year classes are present, like land-based farms and hatcheries, should be used.

5.5
6.1
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7.1
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7.3

Albert Schweitzer Stiftung für unsere Mitwelt
Schoelerpark 5 | 10715 Berlin

World Wildlife Fund
Mrs Katherine Bostick
Aquaculture Program Officer
1250 24th Street, NW
Washington DC 20037-1193
United States of America

June 10, 2011

Subject: standards for responsible salmon aquaculture; recommendations by fair-fish

Dear Mrs Bostick
dear members of the FTAD steering committee

In regard to your work to develop global standards for responsible salmon farming, we would like to thank you for your efforts as we are aware that this is an important but also difficult process. However, as we believe that some extremely essential issues have not been included in your draft, we would like to take the public comment period as an opportunity to join fair-fish association in their call for the inclusion of several improvements.

The main points that we are concerned with are fish welfare and the use of wild forage fish.

1. Animal welfare

The SC decided to not comprehensively address fish welfare because of several reasons: among others, due to the lack of expertise in this field and because this issue originally did not fall under the mandate of the SAD. However, we strongly advise you to reconsider your position on this as it would have the potential of improving the lives of millions of fish.

What are other reasons for including fish welfare more comprehensively?

First of all, along with fair-fish, we believe that any certification scheme should not only address ecology and sustainability issues, but also animal welfare as a central factor. It makes sense to include fish welfare now because it will certainly become an issue in the future anyway. In regard to this, we urge you to invite fish welfare experts to be a part of the dialogue. There are certainly more factors to consider than just fish health when discussing fish welfare, as for example stocking density, minimum requirements for rearing practices, transportation, and killing. The lack of fish welfare in such operations results in a variety of problems, which also have negative economical consequences. These problems entail, among others, increased mortality and disease rates as well as a loss of flesh quality.

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2. Wild forage fish

Along with fair-fish, we think that reducing the amount of wild fish used for fish feed is crucial. This is also a major welfare concern as forage fish endure severe suffering in the industrial fishing and slaughtering process. Of course, at this point it is not possible to cease using forage fish altogether, but generally, we should aim for the development of aquacultures that are completely independent of the mainstream fishery, and reducing the FIFO rates would help in this process. Sustainable sourcing of forage fish is a central issue and instruments other than only ISEAL and MSC should be considered for this, for example the fisheries certified by Friend of the Sea. Furthermore, a clear limitation of the use of wild forage fish should be set to an absolute minimum according to the fair-fish standard for aquaculture, as well as a guideline on the best use of fish by-products and waste fish.

Again, we strongly urge you to take the amendments of the fair-fish association into account and reevaluate your current stance on fish welfare.

Sincerely

M. Kl

Mahi Klosterhalfen | CEO

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Rebecca Clarkson
*Organization/Company: Aquaculture New Zealand Ltd (AQNZ)
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2	2.1.1	In NZ the AZE = Mixing Zone which is established through the RMA process and included in the farm permit	Add new option "Standard must be within the permitted levels set in the resource consent by local authority"
	2.1.1 – 2.1.4 2.1.2 2.2.1 -2.2.3	SAD standards defining "AZE as a distance of 30m from cages" are too prescriptive and do not allowfor local management of conditions of consent Agree with broadening the methodologies used to test the standards Agree with standards however allowance should be made to review and amend the periodicity (weekly) of monitoring if the farm has met the standards over 52 week period	Require a broader definition of AZE and one which reflects local planning rules and decisions

	2.5.3 2.5.6	Whilst we sympathise with the standard in most instances such mortalities will be outside the control of the farmer. Ditto above, especially in the case of marine mammals however the standard is acceptable	Amend standard to read “0 deliberate mortalities”
Principle 3	3.1.1	This is difficult in NZ. There are three sea cage growing areas each operated by one company the areas are >300km apart. So whilst we do not have ABM zones we do have ”company based management” zones. This meets the requirements for an ABM because there is 100% involvement of the farmers in the area. Participation in the area base management schemes are for managing disease and parasite treatment.(Appendix II). Salmon diseases and sea lice do not occur in NZ	Amend the standard(s) to reflect NZ situation Amend standard(s) to reflect that these standards are currently not applicable to NZ
	3.1.3	Not applicable to NZ (no sea lice)	Ditto above
	3.1.4	Ditto above, testing not required	Ditto above
	3.1.6	Not applicable to NZ (no sea lice)	Ditto above
	3.1.7	Ditto above	Ditto above
	3.1.8	Ditto above, no testing required	Ditto above
	3.2.1	King salmon is not a native of NZ (it was introduced in 1890’s) and is now widely spread through the centre regions on the east coast of the South Island. The species has never been “widely commercially produced” as it was introduced as a recreational fish(ery).	Ditto above, the NZ industry cannot meet the wording of this standard. Amend wording of standard by inserting the words “or acclimated” after the word “production”

	3.4.1	This standard is difficult to manage because of innate difficulty of counting escapees	Amend standard to provide for this uncertainty
Principle 4		The purpose of Principle 4 is acknowledge by the NZ industry however as in most countries farmers will rely on the standards of their feed manufacturers to reach these standards	
Principle 5	5.1.1 5.1.2 5.1.4 5.2.1 5.2.2 – 5.2.8 5.3.1 and 5.3.2 5.4.1	Acknowledged however it needs to be stressed that currently salmon diseases and parasites do not impact farm salmon in NZ Acknowledged but currently an un-needed extra cost for NZ farmers Mortalities are recorded in NZ but there is no reason for post mortem – only adds cost Acknowledged, but currently not needed, therapeutants, medicinal treatments and chemicals not used on farms Ditto above This indicator is not relevant to NZ. Single year class management occurs where it is desirable to break disease/parasite cycles. There is no reason for the standard to be achieved in NZ.	Suggest amending to 2 visits per year where it can be demonstrated that no diseases or disease/parasite treatment has taken place on the farm over the previous fish cycle Amend standard to state that post mortem is not required where it can be demonstrated that no disease/parasite treatment has taken place at the farm over the previous fish cycle Acknowledge in standards that disease and parasite treatments do not occur in NZ Ditto above Ditto above Amend the standard to exclude NZ salmon farmers Ditto above Ditto above

	5.4.2 5.4.3 5.4.4	For the reasons given above, The requirement for a veterinary acceptance adds cost for no purpose. Not applicable, well boats are not used in NZ Acknowledged	Ditto above Ditto above
Principle 6			
Principle 7			
General comments	The standards do not recognize the uniqueness of King (Chinook) farming in New Zealand (NZ) National and local environmental standards are	• King salmon are the only species of salmon farmed in NZ • Trout farming is not lawful in NZ and as a result King salmon are farmed in freshwater • King salmon are not native to NZ • King salmon is not "commercially produced" but is widely acclimated to NZ (>100years) • NZ waters (marine and freshwater) are recorded as being free of infectious salmon pathogens • NZ has had no history of infectious salmon disease outbreaks • NZ has no ectoparasites affecting farmed salmon • No antibiotics, therapeutants or other chemicals used in the treatment of salmon diseases are used on salmon farms in New Zealand • Permits for salmon farms are issued via the RMA which sets conditions relating to mixing zones, environmental and social	AQNZ invites (a) representative of the SC to visit NZ to assess on behalf of the Committee the relevance of some parts of the standards to NZ salmon farmers. Some standards are not possible to attain in NZ (the standards are irrelevant and especially those relating to Principal 3) because the naturally occurring standards are higher than proposed standards.

	protected by the Resource Management Act (1991) - RMA National and local fisheries standards are protected by the various Fisheries Acts Recognition of NZ's special position in respect of salmon aquaculture	sustainability and fisheries resources • The Ministry of Fisheries assesses the impact of marine farms on commercial, recreational and customary fisheries prior to the granting of a marine farm permit AQNZ thanks the SC for making available the opportunity to comment on the Salmon Aquaculture Dialogue Draft Standards and asks that the Committee makes itself aware of the very unique and special nature of the King salmon farming industry in NZ AQNZ supports the intent of the standards however by insisting on some standards which, because of the uniqueness of NZ's salmon aquaculture, are excessive, the SC is <u>not</u> "permitting the industry to remain economically viable"	

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**

Principle	8.4	See 3.2.1 above	See 3.2.1 above
Principle 2	ADDITIONAL REQUIREMENTS FOR OPEN (NET PEN PRODUCTION)	The indicator or standards for 8.2.4 – 8.2.8 assume that smolts only are grown in freshwater net pens. In NZ trout farming is unlawful and a number of freshwater salmon farms exist. Some of these are in fast flowing hydro electric water supply raceways and are permitted via the RMA.	Amend the standards to reflect the freshwater net pen industry in NZ
Principle 3			
Principle 4			
Principle 5			
Principle 6			
Principle 7			
General comments			

Formulario de Comentarios para Borrador de Estándares Diálogo sobre Salmonicultura

Segundo periodo de Comentarios Públicos: 31 de mayo a 30 de junio 2011

El Formulario de Comentarios completado debe ser enviado a la dirección de correo electrónico: salmonaquaculture@wwfus.org hasta las 11:59 p.m. EDT del 30 de junio de 2011.

*Nombre: Maureen Alcayaga Godoy
*Organización/Empresa: ACOTRUCH A.G.
*Dirección de correo electrónico: ___________________ _________________________

Nota: Es absolutamente obligatorio que complete toda la información solicitada y marcada con asterisco (*), ya que todos los comentarios serán publicados en el sitio web del Diálogo sobre Salmonicultura, citando la fuente de ellos (nombre de quien comenta e institución a la cual pertenece), lo cual se encuentra alineado con la política de transparencia del Diálogo. La dirección de correo electrónico no será publicada, pero es necesario contar con ella para clarificar la información en caso de ser necesario.

COMENTARIOS SOBRE LOS ESTÁNDARES PARA ENGORDA DE SALMONES

Principio	Criterio/Indicador /Estándar (ej. 2.1.2)	Comentario(s)	Solución propuesta o corrección
Principio 3	**3.1.2**	Eliminar sobre la disponibilidad de trabajar con ONG proporcionándole datos, pues la inform ación que se requiere es de total dom inio de cada empresa, es decir, corresponde a información privado. Sin perjuicio lo anterior, toda aquella inf ormación de carácter público generado por las empresas productoras tendrá disponibilidad.	Debe ser suficiente con proporcionar los datos a la Administración y a entidades relacionadas con la investigación, los que adem ás deben comprometerse a entregar los resultados de sus estudios.
	3.1.4	Para el caso particular de Caligus, existe un reglam ento, por lo tanto el manejo, control y prevención de este parasito ya ha sido abordado por la Autoridad, siendo competencia de ésta definir la frecuencia de m uestreo y la entrega de resultados e información. Para el caso en el que exis tan reglamentos específicos para la vigilancia y control de los ectoparásitos del genero *Caligus*, es necesario que el Dialogo sobre la salmonicultura los considere, ya que, estos reglamentos se sustentan en el conocimiento científico específico de las regiones en que son aplicados los reglamentos en cuestión.	Para los casos de productores de Chile éste estándar necesariamente debe a plicar las disposiciones contenidas en el R eglamento Específico de Vigilancia y Control del exoparásito del genero *Caligus* (PSEVC-Caligidosis). Resolución Exenta (Se rnapesca) Nº 2.117 de 2009.
	3.4.1	En la práctica aplicar este estándar en zonas especificas resulta imposible por la relación que existe entre dos hechos fundamentales: 1) El bajo	Fijar nuevamente este estándar el cual considere una gradualidad hacia un objetivo determinado, además éste debe considerar las diferencias que existen entre regiones y

		número de peces a partir del cual ya se considera un escape masivo (200); y, 2) la cantidad de años en los cuales se acepta sólo un evento de escapes masivo para alcanzar la certificación. Como ejemplo es posible mencionar el robo de salmónidos que sufren los productores en Chile, el que debido a la forma en que ocurre y a los niveles de biomasa robados se acepta de manera unánime la existencia de una "mafia del salmón". Este ilícito se ha convertido en una constante por varios motivos entre los cuales destacan las grandes extensiones existentes en las zonas de cultivo del sur del país. El mecanismo para consumar el robo se refiere a la rotura de las redes peceras para que se produzca el escape de los ejemplares, los que en forma posterior son capturados a través de embarcaciones. Si bien los productores se encuentran trabajando fuertemente con la Administración en este tema con el fin de detenerlo, este hecho fortuito escapa fuertemente del alcance de los productores. Además, eventos como las condiciones climáticas y el choque de embarcaciones con módulos de cultivo (ejemplos citados en el borrador de los estándares) entre otros, necesariamente si deben ser incluidas como hechos inesperados, pues no existe ninguna instancia en la cual dejarían de serlo, incluso si los	trabajar activamente con la totalidad de sus productores.

		centros mantienen un análisis detallado de los riesgos a los cuales el centro se encuentra expuesto junto a medidas para evitarlos, éstos continuarían siendo eventos proclives a desencadenar situaciones de escapes. Para elaborar estándares relacionados a escapes de peces el Dialogo debe abandonar la presunción de culpabilidad que recae sobre los productores. Finalmente los eventos de escapes masivos en conjunto con el periodo propuesto para aplicar este estándar (10 años), no contribuyen de manera alguna al incentivo de obtener la certificación ASC.	
	3.4.2	Resulta de suma importancia mencionar como fue alcanzado este número (300), ya que su aplicación práctica resulta altamente compleja más aún cuando no se considera ningún plazo para su puesta en marcha.	Este estándar debe poseer una gradualidad para su aplicación, la que debe considerar tiempo y número de peces escapados diferenciados por regiones hasta alcanzar un objetivo común.
	Observaciones generales relacionadas a este Principio: **1.** Propuesta relacionada con la migración del proceso de smoltificación a sistemas cerrados de cultivo.	La aplicación de todos los estándares involucra profundos y exigentes cambios a nivel productivo, que requieren, en la medida que puedan ser aplicados, gradualidad para su implementación. Considerando que dentro de este	Es necesario aportar mayor información que enriquezca los datos disponibles en cada región para la óptima aplicación de esta medida. Específicamente resultan necesarios análisis detallados de tipo técnico, logístico, normativo (de una zona en particular), etc., que permita indicar a productores, de manera informada, que esta medida es posible de ser

		principio se hace alusión a realizar la smoltificacion en sistemas cerrados de cultivo y a que en este mismo principio se consideran altos estándares para optar a la certificación, no se justifica el traslado del proceso de smoltificación desde sistemas abiertos a sistemas cerrados de cultivo.	desarrollada. Es decir, es necesario indicar a los productores de una zona en particular que las alternativas de smoltificación propuestas por el documento son viables.
	2. En relación a la orientación de la Auditoria.	Considerar remontarse un periodo de 10 años para auditar un centro de cultivo en relación a los escapes de salmónidos, se traducirá en un desincentivo, debido a que los centros de cultivo que hayan tenido, que al menos un escape en los diez años anteriores de producción, deberá esperar, en el mejor de los casos, los siguientes 9 años para optar a la certificación.	Considerando que este tipo de certificación recién comienza, la Auditoria no debe aplicar el tiempo indicado al menos durante los primeros 10 años a partir de la publicación de los estándares finales. Cualquier periodo estipulado para contar los eventos de escapes debe ser considerado en forma posterior a la publicación de las normas, de este modo se entrega la posibilidad de que todos los productores se informen al respecto y puedan aplicar sus disposiciones en las producciones futuras. De manera adicional, se sugiere reevaluar el periodo de 10 años establecido, a modo de reducirlo permitiendo que este principio pueda realmente ser aplicado y de utilidad efectiva
Principio 4	**4.2.1; 4.2.2; 4.2.3**	La aplicación de estos estándares necesariamente requiere de un catastro para cada una de las zonas (países) donde se cultiven salmónidos, el cual indique que existe abastecimiento para cubrir todos los requerimientos, además de especificar la viabilidad de su aplicación.	Este estándar debe ser eliminado, al menos en su aplicación a determinadas áreas, hasta contar con los estudios técnicos que avalen la existencia de un abastecimiento real para todos los productores de las diferentes regiones.

	4.3.1.	En este punto se indica sobre el cumplimiento de los estándares de la ISEAL por parte de las pesquerías proveedores de m ateria prima para alimentos de salmónidos. Bajo es te contexto: 1. ¿Es realmente posible su aplicación a todos los productores en relación a las zonas en que se encuentran? 2. ¿Es necesario que lo s productores de salmónidos se hagan cargo de las pesquerías de una determ inada región, mediante la exigencia del cumplimiento de es ta certificación? 3. ¿No podría ocurrir con esta medida que las pesquerías dejen de abastecer a los productores de salmón derivando su producción hacia mercados menos exigentes? 4. Si lo anterior ocurriese ¿Cóm o se abastecerá la industria salmonicultora de este insu mo para alim entar a los peces en cultivo? Es importante manifestar que en zonas particulares existe una gran variedad de potenciales compradores de harina y aceite de pescado por lo que si se encuentran o no se encuentran los productores de salmónidos entre ellos no generara ningún cambio; es decir, para un productor esta puede ser la única forma de elaboración de alim ento de pescado, ya que, no posee otra opción de compra.	No incluir la gestión de las pesquerías com o una exigencia dentro de los estándares, por cuanto en zonas o regiones especificas esta problemática escapa del alcan ce de los productores de salmónidos.

	4.5.1; 4.5.2	En este p unto resulta neces ario cumplir con la normativa vigente del país en cuestión. En Chile, la au toridad sanitaria, marítima y de salud, entre otra s estblecen las norm ativas y fiscalizan su cumplimiento respecto a disposición de los desechos no biológicos utilizados en la industria. Se reconoce que el re ciclaje, es una opción dentro de las técnicas que se utilizan para m anejar adecuadamente los desechos.	Indicar que el cum plimiento de la norm ativa de la zona en cuestión, cuando exista normativa asociada a la disposición biosegura de desechos, resulta suficiente para el cumplimiento de este estándar.
	4.6.1	Para su ó ptima aplicación, este estándar requiere que indique una gradualidad a partir de la fecha de publicación de los estándares finales.	Para aplicación correcta de esta norm a, se requiere su una graduali dad en su aplicación a partir de la publicación de los estándares finales, de tal m odo de hacerla factible y eficiente.
Principio 5	**5.1.5; 5.1.6; 5.1.7**	Resulta importante manifestar que los estándares descritos en el principios 5, no aplicarían antes situaciones de brotes de enfermedades. Si bien se conviene en velar porque exista un co ntrol sanitario en los centros de cultivo, se debe tener en consideración que el cultivo de salmónidos es una actividad altamente dinámica y riesgos en la que inciden innumerables factores bióticos y abióticos, algunos de los c uales escapan al control que puedan tener los productores. De esta manera, es preci so considerar que la certificación no debe ser arriesgada por un evento de esta tipo, más bien debe considerar el m anejo	Incluir un estándar que indique sobre la posibilidad de que se presenten m ortalidades masivas en un determinado centro y que a partir del m anejo sanitario aplicado (bioseguridad) sea posible m antener la certificación o posibilidad de postular a ésta.

		del o los centros en cuestión ante esta situación.	
Comentarios Generales relacionados con los estándares	La generalidad de los estándares considera conocimiento específico en torno a las particu laridades de una determinada biogeografía (hemisferio norte).	Bajo este c ontexto la aplic ación de los estándares propuestos requieren de un análisis detallado que demuestre su viabilidad en la práctica para cada u na de las zonas (países productores), en las que se pretendan aplicar los estándares propuestos.	Para aplicar los es tándares se requiere de una gradualidad a partir de su publicación final que asegure su puesta en marcha por parte de los productores, en caso contrario estos se traducirán como un desi ncentivo para que los productores de salm ónidos alcancen la certificación.

COMENTARIOS SOBRE LOS ESTÁNDARES PARA PRODUCCIÓN DE SMOLTS (Sección 8 del documento)

Indicador/Estándar (ej., 8.4, or 8.22)	**Comentario(s)**	**Solución propuesta o corrección**
8.4	En este caso se requiere de una adecuada definición de "zona". Es necesario que exista una evaluación detallada (análisis técnicos, económicos, etc.), de la viabilidad de desarrollar la smolticación en sistemas cerrados que logren sostener una salmonicultura según las proporciones que esta alcanza en cada una de los países en particular. De igual manera, es necesario que exista una evaluación detallada que considere aspectos biológicos, fisiológicos y productivos de cada una de las especies producidas (salmón coho, trucha, salmón atlántico, salmón chinook) en una zona o país determinado, a fin de evaluar la viabilidad real que cada una de ésta tiene respecto de su smoltificación en sistemas de producción cerrados.	Esta definición debe incluir al país como una zona. Mientras no existan estos estudios que acrediten como una verdadera opción la migración del desarrollo de la smoltificación de sistemas abiertos de cultivo a sistemas cerrados, no es posible exigir a productores de determinadas regiones este estándar para la certificación respectiva.
8.5; 8.6; 8.7	Los estándares contenidos en estos puntos consideran medidas para la contención y reducción de los eventos de escapes de peces al ambiente, por lo que en virtud de ello, considerar la migración a sistemas cerrados de cultivo no se justifica.	Durante un periodo determinado a partir de la publicación de los estándares finales, se debe evaluar la necesidad de migrar en forma completa (sin posibilidad alguna de desarrollar la smoltificación en sistemas de cultivo abiertos), o considerar aplicar este estándar sólo a una parte de la producción total de smolt (como la smoltificación desarrollada en determinados cuerpo de agua), utilizando la información originada de la aplicación de estos estándares (8.5; 8.6 y 8.7).

8.8; 8.9; 8.10	Los estudios relacionados a estos puntos deben ser desarrollados para evaluar la posible migración de la totalidad del proceso de smoltificación a sistemas de cultivo cerrados que puedan sostener las producciones a nivel mundial.	Con los resultados de estos estudios (los cuales no pueden ser responsabilidad de los productores), será posible enriquecer sobre los impactos del desarrollo de la smoltificación en tierra, por lo que estos estudios deben encontrarse en una posición anterior a la decisión de trasladar la producción de *smolt* a sistemas cerrados.
8.12	Indicar una definición de "vacunas eficaces"	Indicar una definición adecuada para "vacunas eficaces", por cuanto en muchos casos los beneficios del uso de vacunas no es claro.
8.25	En general la operación de centros de cultivo considera fuertes medidas para mitigar los escapes de peces, por lo que no se justifica considerar que de todos modos la smoltificación migre hacia sistemas cerrados de cultivo, al menos en la totalidad de los ambientes y/o áreas usadas para el desarrollo de este proceso. Bajo este contexto, zonas donde no se encuentran salmónidos silvestre y, por lo tanto, no se presenten áreas adecuadas para la reproducción ni existen pruebas contundentes del asilvestramiento de éstos peces, se presentan como antecedentes para considerar la migración de la smoltificación hacia sistemas cerrados.	La aplicación de este estándar debe ser eliminado en áreas determinadas donde no existan pruebas suficientes de los impactos de este proceso productivo en relación al número de peces escapados.
8.26; 8.27	Estándares que consideran un impacto mínimo, por lo que sus resultados pueden constituir una prueba de que pueden mantenerse sistemas abiertos de cultivo a través del tiempo.	Su aplicación debe considerar un plazo prudente a partir de la publicación de los estándares finales.
8.27	No es factible en la práctica considerar que	Eliminar este estándar en la forma en la que se

	un centro de cultivo acreditado se haga cargo de las acciones de un centro de cultivo que no se encuentra acreditado n i pretenda acreditarse.	exige, por cuanto su cu mplimiento escapa del alcance de los productores de *smolt*.
Comentarios Generales relacionados con estándares para producción de smolts		

Association of
Salmon Fishery Boards

RAFTS

Comments on 'Draft Salmon Aquaculture Dialogue Standards'
June 2011

Introduction

The Association of Salmon Fishery Boards is the representative body for Scotland's 41 District Salmon Fishery Boards (DSFBs) including the River Tweed Commission (RTC), which have a statutory responsibility to protect and improve salmon and sea trout fisheries. The Association and Boards work to create the environment in which sustainable fisheries for salmon and sea trout can be enjoyed. Conservation of fish stocks, and the habitats on which they depend, is essential and many DSFB's operate riparian habitat enhancement schemes and have voluntarily adopted 'catch and release' practices, which in some cases are made mandatory by the introduction of Salmon Conservation Regulations. ASFB creates policies that seek where possible to protect wider biodiversity and our environment as well as enhancing the economic benefits for our rural economy that result from angling. An analysis completed in 2004 demonstrated that freshwater angling in Scotland results in the Scottish economy producing over £100 million worth of annual output, which supports around 2,800 jobs and generates nearly £50million in wages and self-employment into Scottish households, most of which are in rural areas.

Formed in 2005, Rivers and Fisheries Trusts of Scotland (RAFTS) is an independent freshwater conservation charity representing Scotland's national network of 25 rivers and fisheries Trusts and Foundations. Our members work across over 90% of Scotland's freshwaters to protect and develop our native fish stocks and populations by undertaking a range of activities including freshwater, river habitat restoration, fish and fisheries monitoring, research and education programmes. RAFTS is the membership organisation of the fisheries and rivers trusts operating in Scotland and is, itself, a charity and company limited by guarantee.

We welcome the opportunity to comment on the Draft Salmon Aquaculture Dialogue Standards. Our main concerns with regard to the sustainability of aquaculture continue to be the potential negative effects of sea lice and escapes. We have therefore limited our responses to the sections of the consultation dealing with these issues. We have used the requested template for our comments below.

For further information please contact:
Dr Alan Wells | ASFB Policy and Planning Director

Callum Sinclair | RAFTS Director

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
Principle 1			
Principle 2			
Principle 3	3.1.4	We welcome the suggestion that test results for on farm testing for sea lice should be made publically available. We believe that any such data must be transparent and therefore should be made available in its raw form, rather than any sanitized or aggregated version. We do not believe that the current scheme operated by the SSPO would or should meet the requirements of this indicator/standard.	Weekly on-farm testing for sea lice, with ~~test results~~raw sea lice counts made easily publicly available within 7 days of testing.
	3.1.5	We welcome the inclusion of this indicator as it represents one of the key data gaps in Scotland.	This indicator should also be coupled with the development of an effective sea lice dispersal model for the area in question.
	3.1.6	Again, we welcome the inclusion of this indicator. Such monitoring should be entirely funded by the industry.	
	3.1.7	Whilst we welcome the inclusion of maximum on-farm lice levels which are set at a lower level than those set out by the SSPO Code of Good Practice in Scotland, we are still concerned that 0.1 mature female lice per fish on a particularly large farm may still not provide adequate protection of wild fish. We believe that the size of the farm is critical in determining whether too many sea lice are being produced by the farm. Indeed, Marine Scotland Science have recently made the following statement in a number of farm applications (based on the SSPO	A possible partial solution would be to include a maximum on-farm sea lice level of 0.1 lice per fish ***in addition to*** a treatment trigger if monitoring of the wild fish population exceeds the thresholds described in Appendix III, subsection 2. This would occur even if the on-farm lice levels fell below the threshold and would be coordinated across the management area with an overall objective of achieving zero ovigerous lice on the farms (in line with the NASCO International goal).

		thresholds): ‘*However, it should be noted that adherence to Integrated Sea Lice Management (ISLM) as described in the industry Code of Good Practice may not necessarily prevent release of substantial numbers of lice from aquaculture installations. The CoGP takes no account of farm size, or number of farms in an area, in setting threshold levels for sea lice treatments. This may be appropriate when the aim is to protect the welfare of farmed fish but it will not necessarily prevent significant numbers of larval lice being shed into the environment, and posing a risk for wild fish particularly in the case of larger farms or management areas holding a large biomass of farmed fish*.’ We would also seek clarification as to what is meant by ‘mature’ female lice. We would hope that this does not refer to gravid female lice in which the eggstrings have already developed. The document should refer to ‘adult’ female lice or, in recognition that treatment may take some time, it may be more appropriate to use pre-adult female lice as the maximum in an attempt to ensure that treatment occurs before any larval lice are released. We do not support Option B, because, as the consultation document sets out, under Option B, the feedback from wild monitoring may come too late for a farm to adapt its management quickly enough to be protective, particularly for out-migrating juveniles.	
	3.1.8.	We are not clear as to whether this data would be fully publically available.	We believe that any such data must be transparent and therefore should be made available in its raw form, rather than any sanitized or aggregated version. We do not believe that the current scheme operated by the

			SSPO would or should meet the requirements of this indicator/standard.
	3.4.1	We are concerned that this indicator defines an escape episode as one involving 200 or more fish. This figure takes no account of the sensitivity of the wild population in the area in which the farm is located – in some instances we would expect that 200 escapees could have a massive impact on a small, degraded, vulnerable population of wild salmonids and therefore this standard would not be protective of that population.	Given that the International Salmon Farming Association is signed up to the NASCO International Goal of '*100% of farmed fish to be retained in all production facilities*', and in recognition of the very real progress that the industry has made with regard to containment in Scotland, we believe that an escape event should be defined as an escape of *any* fish. In addition, there are some locations where farming is not acceptable as it cannot be carried out in a sufficiently precautionary manner to protect degraded, vulnerable wild salmonid populations. In such locations closed containment should be the minimum requirement for accreditation.
	3.4.2.	Please see above comments.	Please see above comments.
	3.4.6.	We welcome this standard, but would ask that an independent assessment of the rigor of escape prevention planning and employee training is included in this indicator.	
Principle 4			
Principle 5	Criterion 5.3	We would recommend the inclusion of a new indicator here. This would alert wild fish interests that sea lice treatments are failing and that wild fish may be at risk, and would allow neighboring farms and those in adjacent areas to take such resistance into consideration in their selection of sea lice treatments.	Inclusion of a new indicator (5.3.3.) – All farms must report on a publically available database within 7 days of the event, any lack of efficacy or suspected resistance in any sea lice treatments.
Principle 6			
Principle 7			

General comments			

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION (SECTION 8 of document)

Indicator/Standard (e.g., 8.4 or 8.22)	**Comment(s)**	**Proposed solution or amendment**
8.24. & 8.25.	We welcome these indicators as we believe that FW escapes in water bodies with native salmonids carry unacceptable environmental risk.	
General comments on smolt standards		

WWF SALMON AQUACULTURE STANDARDS

COMMENTS ON DIALOGUE STANDARDS

Pamela Parker, Executive Director
Atlantic Canada Fish Farmers Association

General Comments:

- Many standards and/or indicators are not within the scope of responsibility of an individual farm – this is particularly true in the area of wild species monitoring for disease and parasites, feed manufacture, and standards for smolt suppliers
- A salmon farm cannot be held responsible for the population variability of wild species within the proximity of that farm; too many factors influence population dynamics for wild species
- It is unclear whether the traceability requirements relating the farm's suppliers are simply a one –up; one-down expectation. An example – a feed company can purchase soya meal from a single supplier; but that supplier may have purchased that soya meal from multiple soya suppliers.
- Appendices have been amended and/or added.
    - In the case of Appendix VII on water quality monitoring detail is still lacking to enable a full assessment/review.
    - Appendix II indicates the farm may be asked to provide empty containers as evidence of treatment; these containers must already be returned to vendors as part of the regulatory process. This would not, therefore, be appropriate evidence in Canada.
    - Appendix VI – the detail on the transparency of farm-level performance data will put companies in conflict with various regulations such as US Anti-trust laws, etc. and the competitive advantage a company has operating in a global market place.
- While data should be available for audit, submission of data directly to ASC is inappropriate and not in keeping with the kind of data collected by MSC. If ASC requires data to evaluate the effectiveness of a specific indicator or standard they should conduct that evaluation through a specific project with their program auditors and/or certified companies as part of an ongoing program evaluation.
- We are concerned that the salmon farming sector is being held at a different level than other farmed species. Areas where the indicators and/or standards are much more prescriptive for salmon than tilapia or shrimp are in the use of chemicals and therapeutants; escapes and feed. This is inappropriate considering it is the same body that will certify all of these species.

PRINCIPLE 1: COMPLY WITH ALL APPLICABLE INTERNATIONAL AND NATIONAL LAWS AND LOCAL REGULATIONS			
1.1.5	Presence of documents demonstrating that the farm has provided the buyer of its salmon a list of all therapeutants used in production.	Yes	*Amend to read: Evidence that fish health documents are available for provision to the buyer of its salmon upon request. These documents will include a list of all therapeutants used in production.*
PRINCIPLE 2: CONSERVE NATURAL HABITAT, LOCAL BIODIVERSITY AND ECOSYSTEM FUNCTION			
2.1.1 – 2.1.4	Indicators for monitoring / faunal indices are for soft bottom substrates only; "…effects on hard bottom sites are developed. In order to not have to meet 2.1.1 to 2.1.3, the farm will have to clearly demonstrate <u>beyond doubt</u> that the site is entirely hard bottom and that these measurements cannot be taken. – it isn't possible to demonstrate anything in dynamic ecosystems 'beyond doubt" Suggest that monitoring under 2.1.2, 2.1.3 and 2.14 only if redox or sulphide levels are above a certain level; at most they should only need to be conducted once every 2 to 3 production cycles.		
2.2.3	Evidence of weekly monitoring of nitrogen and phosphorous levels on farm and at a reference site.	Yes	*Since there are no levels set why is this monitoring required? Nitrogen and phosphorous at the farm will not necessarily have anything to do with plankton blooms and you have not asked for that monitoring in the standard. Our blooms often come from off shore so I am not sure how the farm measurements would be relevant.* *Providing results to ASC data base is an unreasonable request.*
2.4.1	Evidence of an assessment of the farm's potential impacts on biodiversity and nearby ecosystems that contains at a minimum: a) identification of proximity to critical, sensitive or protected habitats and species, b) description of the potential impacts the farm might have on biodiversity, with focus on those habitats or species, and c) a description of strategies and current and future programs underway to	Yes	*I would assume that, as occurs here in Canada, all of these issues have been considered by the regulator prior to the farm receiving a license to operate; we question the value of providing 'evidence' that the farm is aware of the ecosystem within which it operates nonsensical.* *Who would evaluate the plan to address these issues? To what level of responsibility for potential impact is being placed on the farm versus other sources of potential impact?* *Burden of proof is unreasonable - it is scientifically impossible to prove no impact. It is also unreasonable to place full responsibility on ecosystem fluctuations on a single cause – aquaculture.*

	eliminate or minimize any identified impacts the farm might have and to monitor outcomes of these programs and strategies (See Appendix I subsection 3 for details)		
2.4.2	Allowance for the farm to be sited in a protected area or areas determined to be of High Conservation Value (HCV)	None	*Again, notes to this indicator appear to place the burden of proof on the farm operators to prove there is no negative impact – proving that there isn't a negative impact is not scientifically possible.* *It appears that if the regulator within the jurisdiction approves siting of the farm within a HCV, then the ASC should accept that ruling.*
2.5.3	Number of mortalities of endangered or red-listed marine mammals or birds on the farm	0	*Allowance should be made to enable lethal action in exceptional circumstances to support humane response if required*
2.5.4	Evidence that the following steps were taken prior to lethal action against a predator: 1. All other avenues were pursued prior to using lethal action 2. Approval was given from a senior manager above the farm manager 3. Explicit permission was granted to take lethal action against the specific animal from the relevant regulatory authority	Yes	*#3 ignores the concern that lethal action could be required due to human safety concerns; seeking regulatory permission it a time-consuming action*
PRINCIPLE 3: PROTECT THE HEALTH AND GENETIC INTEGRITY OF WILD POPULATIONS			
3.1.3	Establishment of a maximum sea lice load for the entire ABM and for the individual farm that is based on regulatory requirements. In areas of wild salmonids, loads shall also be based on wild fish monitoring (see Standard 3.1.6) and incorporate a	Yes	*The fact that wild fish monitoring is both outside the responsibility of individual farms and illegal in some jurisdictions makes this indicator unattainable in some regions. We have concern that more fish will be killed as a result of sea lice monitoring than as a result of sea lice.* *Suggest this indicator be deleted and included in 3.1.6 or amended to: Presence of an ABM sea lice management plan to ensure sea lice*

	precautionary low maximum lice level just before and during outmigration		*loads are within safe levels for out-migrating wild salmonids.* *If ASC wishes to keep the use of chemotherapeutants low; then lice levels on farms should be managed for farm fish health except during periods where wild salmonids could be vulnerable. Therefore maximum loads and precautionary levels should not be set.* *Amend to read: Evidence that on- farm sea lice levels are kept within regulated levels during critical out migration periods for wild salmonids.*
3.1.4	Weekly on-farm testing for sea lice, with test results made easily publicly available within 7 days of testing.	Yes	*Suggest that this be amended to read: Weekly on-farm testing for sea lice when water temperatures exceed 5 degrees C during the out-migration period for wild salmonids.* *Posting within 7 days of testing will not be possible and result in errors; amend to monthly.*
3.1.5	In areas with wild salmonids, evidence of data, and the farm's understanding of that data, around salmonid migration routes, migration timing, and stock productivity in major waterways within 50 kilometers of the farm	Yes	*Not all jurisdictions will have access to data on salmonid migration routes*
3.1.6	In areas of wild salmonids, monitoring of sea lice levels on wild out-migrating salmon juveniles or on coastal sea trout (details in Appendix III subsection 1). Monitoring results must be made easily publicly available within 8 weeks of testing	Yes	*The fact that wild fish monitoring is both outside the responsibility of individual farms and illegal in some jurisdictions makes this indicator unattainable in some regions. We have concern that more fish will be killed as a result of sea lice monitoring than as a result of sea lice.* *Suggest this indicator incorporate intent from 3.1.3 and be amended to: Presence of a sea lice management plan to ensure sea lice loads are within safe levels for out-migrating wild salmonids.* *Posting within 8 weeks would not be possible if you want to ensure the integrity of the data.*
3.1.8	In areas of wild salmonids, evidence that the farm has submitted sea lice	Yes	*Such information should be available for audit by ACS but should not need to be submitted to the ASC. This data are already being made*

	testing results and other data points to ASC in the template requested by ASC		*public.*
3.4.1	Maximum number of escapes episodes (defined as 200 or more fish) with the exception of escape episodes that are clearly documented as being out of the farm's control	0, in the most recent production cycle	*There is a conflict between 3.4.1 and 3.4.2* *Suggest amended 3.4.1 to also include the intention of 3.4.2* *Suggestion: Maximum number of escape episodes (defined as 300 or more fish) with the exception of escape episodes that are clearly documented as being out of the farms control.* *Amend indicator to read 1 in the most recent production cycle*
3.4.2	Maximum number of escapees in the most recent production cycle	300	*Suggest this indicator be deleted; intent is covered in 3.4.1* *In the case of most exceptional escape episodes, it is expected that a greater number than 300 fish could escape; therefore this indicators is in conflict with 3.4.2*
3.4.3	Accuracy of the counting technology or counting method used for calculating stocking and harvest numbers	≥98%	*Current counter technology does not have the capacity to achieve the accuracy being called for on this standard. Accuracy and precision advertized by manufacturers are often not achievable in practice.*
3.4.4	Estimated unexplained loss of farmed salmon is made publicly available	Yes	*Delete – escapes, fish mortality, etc. are being covered in a variety of areas. Reporting unexplained losses to the public, which could be the result of a variety of reasons (i.e. birds, counting technology, etc.) seems unreasonable*.

PRINCIPLE 4: USE RESOURCES IN AN ENVIRONMENTALLY EFFICIENT AND RESPONSIBLE MANNER

General Comments on Principle 4:

- These indicators and standards still require the feed manufacturer to provide third party documentation / audit results, traceability of all raw materials, disclosure of transgenic plant material, etc. which could significantly restrict a single farm in achieving certification.

We submit comments on the following indicators and/or standards:

4.1.1	Presence and evidence of traceability of all raw feed ingredients with regard to country of origin and of a certified chain of custody to the level	Yes	*Level of traceability needs to be defined.* *Details may not be available from suppliers for some of the widely used ingredients. Ingredients such as soya meal, canola oil and corn gluten meal come from multiple farms and are pooled by large*

	of detail needed to meet the standards under Principle 4		*companies and sold to a feed manufacturer.* *Suggest removing the reference to "all" raw ingredients and just list those of concern for which documents would be required.*
4.2.1	Fishmeal Forage Fish Dependency Ratio (FFDRm) for grow-out (calculated using formulas in Appendix IV	<1.35	*Appears to equal ~20% fish meal which would likely be achievable in North America; however, Europe, South America and organic producers may have a problem.*
4.2.2	Fish oil Forage Fish Dependency Ratio (FFDRo) for grow-out (calculated using formulas in Appendix IV, subsection 1), OR Maximum percentage EPA and DHA from direct marine sources (calculated according to Appendix IV, subsection 2)	FFDRo <2.95 or (EPA + DHA) < 30 g/kg feed	*FFDRo <2.95 may be too low to meet targets for omega 3, DHA, & EPA in the fish flesh.* *(EPA + DHA) < 30 g/kg appears to allow lots of room to use high levels of fish oil. However, it looks like a mistake as it does not match the formula in AppIV-#2. Also the high level of oil could not be used if it was from forage fish as it would be limited by the FFDRo<2.9**5.***
4.2.3	Protein Retention Efficiency (PRE) for grow-out (calculated using formulas in Appendix IV, subsection 3)	≥35%	*While this standard might be achievable; it could potentially limit the protein levels used in fish feed and result in limiting fish performance. Especially if the number were lowered in the future.* *In addition, this has nothing to do with the sustainability of wild fisheries.*
4.3.1	Timeframe for all fishmeal and fish oil used in feed to come from fisheries certified under a scheme that is ISEAL accredited and has guidelines that specifically promote responsible environmental management of small pelagic fisheries.	5 years after the date of publication of the SAD standards	*Various fisheries are working toward a variety of certification programs and should be considered for approval under ASC – such as IFFO certification which should be an accepted accreditation*
4.3.2	Prior to achieving 4.3.1, the FishSource score for the fishery (ies) from which all marine raw material in feed is derived. (See Appendix IV, subsection 4 for explanation of FishSource scoring)	All individual scores ≥6, and biomass score ≥8	The *Fish Source scoring would seem to be un-workable at present. The wording was changed from "none less than" to "all greater than" but the minimum level is the same*
4.4.2	Percentage of soya or soya derived	100%, within 5 years of	*Delete – this has nothing to do with fish meal and oil and is adding*

	ingredients in the feed that are certified by the Roundtable for Responsible Soy (RTRS) or equivalent	the publication of the SAD standards	*another certification level and restriction and it isn't clear whether suppliers would be certified in 5 years.*
4.4.3	Evidence of disclosure to the buyer of the salmon of inclusion of transgenic plant raw material, or raw materials derived from transgenic plants, in the feed	Yes, for each individual raw material containing > 1% transgenics	*Delete - Unless this becomes a requirement for other meat products on the market, why are salmon being held at a different standard?* *Alternatively – combine 4.4.2 and 4.4.3 to read: Evidence of disclosure to the buyer upon request, of the inclusion of transgenic raw plant material used in salmon feed.*
4.7.2	For any farm that cleans nets at on-land sites, evidence that net-cleaning sites have effluent treatment	Yes	*Will a license to operate issued by an environmental regulator constitute evidence?*
4.7.5	Evidence that the type of biocides used in net antifouling are approved according to legislation in the European Union, or United States, or Australia	Yes	*Amend to read* – Evidence that the type of biocides used in net antifouling are approved according to jurisdictional regulation.

PRINCIPLE 5: MANAGE DISEASE AND PARASITES IN AN ENVIRONMENTALLY RESPONSIBLE MANNER

General Comments on Principle 5:

- *It is critical to remember that treatments using chemotherapeutants are used as a last resort and often as a result of ecosystem dynamics beyond the control of the farmer. All products undergo risk assessments in the jurisdiction where they are approved and restricting use or requiring a reduction in use over time is not realistic.*

We submit comments on the following indicators and/or standards:

5.1.4	Percentage of mortalities that are recorded, classified, and receive a post-mortem analysis	100%	*This standard still does not recognize that not all mortality events result in a dead fish that can be analyzed through a post-mortem*
5.2.1	On-farm documentation that includes, at a minimum, detailed information on all chemicals and therapeutants used during the most recent production cycle, the amounts used (including grams per	Yes	*Suggest 'chemicals' be revised to chemotherapeutants which is the medical term and this deals with fish health.* *Does a veterinarian's prescription constitute 'proof of proper dosing'?*

	ton of fish produced), the dates used, which group of fish were treated and against which diseases, proof of proper dosing, and all disease and pathogens detected on the site		
5.2.5	Maximum cumulative parasiticide treatment index (PTI) score calculated according to the formula: Σ(Average live weight of salmon at treatment in kg)	PTI score < 6.8	*Delete. Setting a PTI (parasiticide treatment index) score when the standards are also calling for all sea lice to be eliminated from farms during critical periods of wild salmon out-migration is unreasonable. In Canada, the maximum use of most chemotherapeutants in a calendar year used is set by regulation.* *Possible amendment: Where no regulation exists, maximum cumulative parasiticide treatment index….*
5.2.7	For any use of antibiotics listed as highly important for human medicine by the World Health Organization (WHO) demonstration that a risk assessment was conducted by the veterinarian prior to prescription and application	Yes	*Amend to read: Any use of antibiotics listed as highly important for human medicine by the WHO be used only as a last resort when a viable alternative is not available.* *We question the capacity of a veterinarian to conduct such an assessment on human health risks.*
5.2.8	Allowance for use of antibiotics listed as critically important for human medicine by the WHO	None	*Amend to read: Allowance for use of antibiotics listed as critically important for human medicine by the WHO only when no other viable alternative is available and with assurance that no residue remains in the meat at time of harvest.*
5.3.1	Bio-assay analysis to determine resistance when two applications of a treatment have not produced the expected effect	Yes	*Achieving a treatment efficacy of less than 90% can be the result of many factors – most critically the life stage of the sea louse or environmental conditions (most sea lice bath treatments target specific life stages of the louse).* *Amend to read: Bio-assay analysis to determine resistance when three applications of a treatment are showing a trend toward lower efficacy without any identifiable cause and when a reduction of lice numbers post treatment are less than 80% for the target life-stage of the sea louse.*

5.4.3	Percentage of fish transported in a closed wellboat, a wellboat with sea lice filtration, or a wellboat with discharge treatment and disinfection	100% , where such transport involves moving fish across management areas	*Current technology for filtration systems do not exist. Amend to remove "with sea lice filtration"*

PRINCIPLE 6: DEVELOP AND OPERATE FARMS IN A SOCIALLY RESPONSIBLE MANNER

General Comments on Principle 6:

- *It is critical that what would constitute 'evidence' is provided for many of these indicators*

We submit comments on the following indicators and/or standards:

6.7.2	Evidence of a policy to ensure social compliance of its suppliers and contractors	Yes	*The question again arises on how deep into the supply chain a farm is required to go and in some remote areas; a choice of a variety of suppliers may not be possible.*

PRINCIPLE 7: BE A GOOD NEIGHBOR AND CONSCIENTIOUS CITIZEN

7.1.3	Evidence that the farm has posted visible notice at the farm during times of therapeutic treatments and has, as part of consultation with communities under 7.1.1, communicated about potential negative health impacts from treatments	Yes	*What is defined as a 'notice'? What is defined as 'negative health impacts' – is this human health? It is irresponsible to suggest that sea lice treatments can have a potential negative human health impact?* *Amend: Evidence that fish health treatment notifications are made available to the public, through emails, posting on websites, etc.*

SECTION 8 STANDARDS FOR SUPPLIERS OF SMOLT

General Comments on Section 8:

- *The certification program is intended for an individual farm; this section is shifting responsibility to that farm to provide records and/or documentation that they may not have access to*
- *You are already asking that the farm provide evidence that their suppliers are operating is a responsible manner; these standards are a duplication*

We submit comments on the following indicators and/or standards:

8.3	Evidence of an assessment of the farm's potential impacts on biodiversity and nearby ecosystems that contains the same components as the assessment for grow-out facilities under 2.4.1	Yes	*Since the certification is for a single farm; expecting that farm operator to be held accountable for potential impact on biodiversity is unreasonable; many land-based hatchery operations have not had such assessments. In addition this is a standard beyond that of most other land-based industries.*
8.16	For any use of antibiotics listed as highly important for human medicine by the World Health Organization (WHO), demonstration that a risk assessment was conducted by the veterinarian prior to prescription and application	Yes	*Amend to read: Any use of antibiotics listed as highly important for human medicine by the WHO be used only as a last resort when a viable alternative is not available.*
8.7	Accuracy of the counting technology or counting method used for calculating the number of fish	≥98%	*This is too specific given current technology; suggest amendment to +/-95%*
8.14	Allowance for use of therapeutic treatments that include antibiotics or chemicals that are banned in any of the primary salmon producing or importing countries	None	*This doesn't work as an all encompassing standard; some products are banned; then permitted, then can be banned again.* *Amend to read: Producers will look for and use an alternative treatment for any antibiotic or chemical banned in any MSPA.*
8.30	Maximum Total Phosphorus released into the environment per ton of production per year according to methodology in Appendix VII, subsection 2	To be determined	*This should be amended to orthophosphate which is the biologically active part of TP responsible for eutrophication which would make the standard more universally significant.* *This is not straight forward in fresh water because of the wide range of receiving water courses for hatchery discharge. From closed ponds to huge rivers, amount of orthophosphate released should be related to the receiving environment. They already have this in place as they exclude hatcheries discharging into the ocean.*

Dear members of the Salmon Aquaculture Dialogue Steering Committee:

The undersigned organizations, all members of the Atlantic Coalition for Aquaculture Reform, agree that while the *Salmon Aquaculture Dialogues Second draft standards for responsible salmon aquaculture* are an attempt at mitigation of the known and well-documented impacts of salmon aquaculture; these draft standards are not, and indeed do not claim to be, an attempt at sustainability. However, in our view responsibility and sustainability cannot be separated. Elsewhere we have defined sustainable aquaculture to be aquaculture that meets the following conditions:[1]

1. It does not degrade the ecosystem in which it is located, or ecosystems on which it is dependent;
2. It is in harmony with economic, social and cultural activities that use the same natural resources;
3. Access to information and participation in decision-making is fair and equitable;
4. All costs are reflected in the cost of production, ensuring that costs are not externalized to the environment, other sectors, or individuals;
5. It does not diminish the ability of future generations to use the same natural resources.

It is critical that we realize that the environment imposes its own limits. In ecological terms this is called carrying capacity, the limit beyond which no growth can be sustained. The recent crash in salmon production in Chile and the significant drop in production over the last several years in New Brunswick (Canada) are evidence that the carrying capacity of a given region can only be ignored at our, and the environment's, peril. We view the *Second draft standards for responsible salmon aquaculture* as failing to substantially meet the above test for sustainability.

The major deficiency of these standards is that they allow environmentally damaging activities associated with open netpen aquaculture to continue. These activities are very well documented in the peer-reviewed literature and include: release of eco-toxic pesticides to the marine environment (bath and in feed); release of farm wastes into the marine environment; escapes of farmed fish; use of wild fish for feed; and presence of sea lice and disease on salmon farms.

A truly sustainable, and indeed responsible, approach would be one that identifies the carrying capacity of a given region and ensures that the cumulative impact of all activities in that region do not exceed that capacity. The Area Based Management (ABM) schemes proposed in the draft standards fail to ensure that these areas operate within the ecological carrying capacity of an area. ABMs are only intended to assist with managing disease and parasites, resistance to treatments, and fish production. They do not prevent an overload on the ecological carrying capacity of a given region.

Given our concern, that the standards cannot ensure salmon farms respect ecological limits, we can not support the standards as proposed.

Sincerely,

Inka Milewski, Science Advisor, Conservation Council of New Brunswick
Matthew Abbott, Coordinator, Fundy Baykeeper
Jordan Nikoloyuk, Sustainable Fisheries Coordinator, Ecology Action Centre
Atlantic Salmon Federation
St. Mary's Bay Coastal Alliance
Nova Scotia Salmon Association

Partnership for the Sustainable Development of Digby Neck & Islands
Friends of Shelburne Harbour
Fundy North Fishermen's Association
Friar's Bay Development Association

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[1] In Harvey, J. and Milewski, I. (2007) *Salmon Aquaculture in the Bay of Fundy: An unsustainable industry*. Fredericton: Conservation Council of New Brunswick., adapted from Bardach, J.E., Ed. (1997). *Sustainable Aquaculture*. New York: John Wiley & Sons, Inc.

Response to public consultation on second draft Salmon Aquaculture Dialogue criteria on behalf of the Atlantic Salmon Trust

June 14th 2011

General comments

The AST would like to take this opportunity to commend the members of the Steering Committee for the excellent work which they have put into bringing the draft criteria to this stage, particularly in view of the large number of responses received during earlier consultation periods and SAD meetings.

Because time is short (we find it disappointing that the consultation period has been cut to 30 days on this occasion, given the complexity of the issues involved, and the range of people who must be consulted for joint submissions) , our main comments are restricted to Principle 3, plus Section 8.

We would make the following over-arching observations:

- **In its present form the salmon aquaculture industry is unsustainable because of its damaging impacts on wild salmon and sea trout. Recognising its undoubted social and economic benefits, the AST is committed to helping the industry minimise damage to wild salmon and sea trout, and the wider environment. Everything in the following submission is predicated on this statement.**

- There is still excessive use of the word ‘should’ in the document; such imprecise terms have no place in an audited standard. How is an auditor to assess compliance with an aspiration, such as is implied by the use of ‘should’?
- In relation to most of the criteria which will form the basis of auditing and assessment for eligibility or compliance, we find it impossible to comment fully in the absence of detailed guidelines for auditors, and information on how these will be applied. There is, for example, no information in regard to the extent to which criteria will be ‘weighted’, the extent to which a record of pre-assessment compliance will be required, the extent of deviation from a precise figure (such as the sea lice levels mentioned in 3.1.7) that will be permitted for a number of audits over a time-period – whether we are talking about ‘three strikes and you’re out’, immediate loss of accreditation for a single non-compliant figure, an allowance for a set number of non-compliant figures over a production cycle, a five-year cycle, etc. AST is very reluctant to give unconditional support to the proposed criteria, without seeing the detailed auditing guidance.
- On a similar note, we feel uneasy about endorsing the document in the absence of more specific guidance on periodicity of revision of the Standard and ‘raising of the bar’. In

particular, the criteria surrounding sea lice management and monitoring of impacts on wild salmonids are likely to require frequent revision as more data become available; monitoring and data-gathering are built into several of the criteria. ***It is essential that accreditation is not given for simply gathering data for its own sake; a clear link is required between data-gathering, analysis of impacts and revision of the Standard.***

- Although mentioned as an 'aside' in places such as Footnote 33, we feel that the document offers insufficient incentive to closed containment salmon farming. Since this nascent sector internalises many of the costs of environmental impacts – including those on wild salmonids - and requires heavy investment to do so, it is necessary for the Standard to give MUCH more encouragement to adoption of closed containment technologies. Otherwise, it leaves them unable to compete with open net farming on cost grounds, and could simply lead to proliferation of open net cages.
- We further believe that any move towards off shore fish farming will require a rigorous evaluation of the costs (both financial and environmental), benefits and likely environmental impacts.
- We strongly support the ethos throughout the document which demands full transparency and much more comprehensive public reporting of data than currently exists in any of the salmon farming countries.

Principle 2

2.5

We have concerns over the Standard's non-acceptance of use of ADDs (Acoustic Deterrent Devices). While we accept that such devices are not without risk to other marine species, and that their efficacy is debatable, we feel that it is wrong to forbid the use of any of the set of 'tools' which salmon farmers can use to minimise predator-caused escape incidents. We would support the concept that farmers must demonstrate that they have used all other seal-deterrent techniques such as promptly removing dead fish, reducing stocking densities, net tensioning, and use of seal blinds, before deploying such devises, but we would not support the complete ban on ADDs.

Principle 3

Criterion 3.1

3.1.2

Footnote indicates that companies should demonstrate commitment to working with NGOs and researchers by providing farm-level data. Unfortunately, the data recently obtained under Freedom of Information requests in Scotland indicates that it may not be safe to rely upon data supplied by the companies themselves; in all cases, independent monitoring of fish disease and sea lice levels is required.

We feel that the wording of this criterion is too vague to be effectively audited.

3.1.3

Establishment of a maximum lice load on an area basis is a laudable ambition. However, in order for this to function adequately, some sort of link must be established between 3.1.3 and 3.1.7. A mechanism is required to put a cap on the total number of farmed fish held within a particular biological area, in relation to potential infective pressure, and to ensure that farms in an area where this cap has been exceeded cannot be given accreditation, even if their own lice management regime is exemplary. Such a cap should reflect the biological holding capacity of a given bay or site. It will be necessary to achieve buy-in from both the salmon farming and wild fish sectors on who delineates the management areas.

3.1.4

AST staff with considerable experience in the realities of sea lice monitoring believe that weekly on-farm testing of sea lice is an example of current good practice within Scotland, Ireland and Norway. Whether or not weekly publication within 7 days is a realistic aspiration is debatable. If an independent inspectorate is involved in auditing/monitoring on-farm counts, given the remote nature of most salmon farming areas, it seems an unfeasible demand to insist that the inspectors should visit the farm site (given prevalent weather conditions in many salmon farming areas), take samples, get these back to a lab for accurate identification and life stage counts, QC the data and publish the data all within 7 days.

In terms of how such monitoring could take place, as asked in footnote 27, we would suggest that the SC looks at the Irish Pest Management Strategy (copy attached).

3.1.5

Footnote 29 defines 'areas with wild salmonids' as those within 75 kilometres of a wild salmonid migration route or habitat. In the case of Scotland and Ireland, there is insufficient knowledge to accurately identify such routes and habitats. It would be preferable to change the wording to 'within 75 kilometres of the river mouth of a wild salmon or sea trout catchment'. We are reassured by the fact that the document recognises that, in the N Hemisphere, this will effectively encompass all salmon farming areas. ***It is essential to note that while almost all salmon rivers will also support a population of sea trout, not all sea trout catchments – for example, those in Orkney and Shetland – have a native population of salmon.***

Footnote 30 indicates that salmon farmers do not require to carry out research into migration routes, etc but merely to demonstrate awareness of it***. It is essential that all known data on migratory routes of wild salmonids be taken into account, and that where these are lacking industry should fund additional independent monitoring and research, so that adequate information is available to allow adaptive management. Ideally, no accreditation of a farm should proceed until the necessary data is in place.***

It is not sufficient to have adequate local knowledge of migration paths of local salmon and sea trout; knowledge of the local dispersal of lice larvae is also critical, since it is where these coincide with migration paths that problems arise – and these problems may affect fish from rivers at some distance from the farm.

The lack of comprehensive information on migration and habitat of sea trout is particularly serious. In many areas of Scotland and Ireland, it is known that post-smolt sea trout remain in coastal waters for much of the year (as over-wintering finnock). This would be particularly the case in inner sea lochs/fjords where marine growth is low, and continuing small body-size makes young sea trout susceptible to lice for longer than in those areas where the post-smolts probably move off further and grow more quickly. The areas of the Scottish NW Highlands (which is the hub of the aquaculture area) where the slower-growing fish are common also tend to be the systems with historically higher numbers of repeat-spawning sea trout (many of these stocks are now severely depleted and in urgent need of restoration). In such systems, finnock are likely to over-winter in fresh water but at their return to the marine environment must still be considered as post-smolts in terms of susceptibility to lice damage because of their small size. The migration routes and feeding grounds of sea trout are, in many cases, not known with any high degree of precision. It should be emphasised that there are also areas where sea trout which remain in inshore waters over extended periods of the year do *not* appear to be particularly susceptible to lice damage. It has been observed that sea trout seem much more able to cope with exposure to lice once they have completed the process of adaptation to salt water. The situation is therefore extremely complex, and it is difficult to describe a scenario which has general rather than local application. The same comment applies equally to the request for suggestions regarding the 'sensitive period' for sea trout. (see also comment on Footnote 31 below).

3.1.6

The monitoring of lice on wild salmon smolts on their out-migration is extraordinarily difficult, especially in areas where runs of wild salmon are at low numbers. The fish which pick up lice on their way through the estuary and inner bays could be well out to sea before any adverse effects of high lice loadings kick in, and the fish would be almost impossible to find and study at this stage. In any case, who would do this monitoring, and who would pay for it? In the case of sea trout, monitoring is more feasible, since many of the fish which pick up abnormal lice-loadings (and which do not die at sea or fall victim to predators) will return prematurely to fresh water, where their condition and lice burden can be more easily observed.

3.1.7

Option a is too much of a blunt instrument. The absolute number of ovigerous female lice per farmed fish is ONLY significant within the context of (a) number of fish on a farm (b) number of fish within a single biological area for sea lice.

The significant factor for welfare of wild fish is TOTAL INFECTIVE PRESSURE, not the number of lice per fish on a single farm site (see comment on 3.1.3 above). The management target for on-farm lice during the 'sensitive period' for wild salmon and sea trout smolts has to be 0 ovigerous lice. It is essential for the Standard to recognise that outside the 'sensitive period', trigger levels of on-farm ovigerous lice of 1 or 2 per fish may be perfectly consistent with high welfare standards for wild salmonids – but this must be monitored and managed within the context of local conditions.

Option b has clearly been structured to address this situation by requiring feedback on lice levels on wild salmonids***. If this option is selected, it is essential that the Standard is worded so as to ensure that, where there are insufficient resources for such monitoring, or where wild fish stocks are too fragile to make it practicable, farms cannot gain accreditation.***

We find no proposal for use of sentinel cages; this may be worthy of consideration. The study group headed by Kjell Moroni in Norway has a major programme of sentinel cage experiments planned at present. It is essential that, if sentinel cages are used to measure impacts on wild fish, then wild fish experts have input to the selection of sentinel cage sites, so that they fully take account of wild fish migration routes, as well as knowledge of lice dispersal within the loch/fjord/bay.

Our view is that the **only** way to manage lice is on a local basis; there is no 'magic number' which will be applicable throughout a single country, never mind globally. Effective management must involve lice management targets (which should be zero for the 'sensitive period' as mentioned above), and these must take account not just of lice numbers per farmed fish but also density of farmed fish within a bay, the holding capacity of the bay, etc. The way ahead is by means of effective government and management, based on local conditions, rather than science. The use of feedback loops will be essential, so that, starting from the best available knowledge on optimal lice treatment trigger levels, results are monitored and management action adapted in response.

We believe that in no location should lice levels per farmed fish be allowed to exceed 0.5 ovigerous females during the 'critical period' – but in some areas levels well below this will be required where the monitoring of wild fish shows that lice numbers are excessive.

Overall, the only rational way to approach this subject is to set a Standard based on the best currently-available data, with a built-in mechanism for revision as more data becomes available.

Footnote 31

The migration period for sea trout is considerably longer. A functioning system which gives ten weeks protection in Spring is probably the best pragmatic solution which is achievable as a rule of thumb. However, as mentioned at 3.5 above, there are also certain sea trout populations where susceptible fish will remain in coastal seas and estuaries for most of the year.

Rationale for 3.1

We have concerns about the wording of paragraph 2 of the rationale for 3.1. While we accept that the quoted sentence comes from the SAD technical experts' report, we feel that much stronger wording can be justified – such as ' There is clear and unequivocal, peer-reviewed published evidence that sea lice of farm origin can present, for all migratory salmonid populations, a significant threat'. For evidence of this, please see Professor Ken Whelan's review of the science on sea lice, available at http://www.atlanticsalmontrust.org/assets/ast-sea-lice-impacts-review.pdf

Paragraph 4 refers to farms testing on-farm lice levels frequently – we would once again emphasise that we believe there is a requirement to factor in independent monitoring and verification by statutory authorities, such as is the case under the Irish and Scottish pest management systems. Since a degree of statutory monitoring is almost universal, we do not feel that this imposes an additional burden on salmon farmers.

Paragraph 6 refers to lice level targets of 'near zero'. We would repeat that the target must be zero. 'Near zero' is too vague, and like the over-use of the word 'should', we wonder how this is to be audited.

Paragraph 7 correctly identifies the knowledge that farmers must have – we would repeat that this knowledge simply does not exist for many areas. The underlying research will require to be funded and undertaken. Our suggested list of priorities is: GIS mapping of all migratory stocks close to the farm(s); a distance protocol from the river-mouth of a wild salmon and/or sea trout catchment – e.g.

50 km; migration routes can be used to refine the protocol, as these data become available, but this will not be a short-term solution.

Additional Information, paragraph 10 acknowledges that establishing 'safe' lice thresholds for Pacific salmon populations is particularly challenging. All of our comments relate to Atlantic salmon and sea trout. ***We would suggest that a separate standard on lice is required for Pacific salmon; otherwise there is a serious risk of confusion and dilution of the Standard because of our lack of knowledge about Pacific salmon.*** This is not a 'one size fits all' scenario, and the document needs to recognise this from the outset.

Comment on auditing guidance for 3.1.5 – this specifies that the farms are not responsible for conducting the research – but this is not a research issue; it is an issue of governance; we fail to see how auditing of this can be credible in jurisdictions where there is no auditing by an independent state inspectorate. We are concerned by the wording that 'a farm does not need to demonstrate that there are data for every small river or tributary or sub-population.' These three categories represent wildly differing degrees of refinement of data. In the context of the Standard, what is a 'small river'? Compared to a river like the Fraser, all Scotland's rivers are 'small'. We feel that a revision of wording is required, along the lines that 'farms must demonstrate that there are data for all biologically-significant populations of salmon and sea trout'. For Europe, this links in with national obligations relating to the maintenance of biodiversity and the protection of all migratory salmonid stocks ***regardless of their size***.

Criterion 3.2

3.2.2 /Rationale

We applaud the Standard's encouragement of the use of biological controls for lice management, such as cleaner fish. However, we do not feel that the requirement to use native species of wrasse is sufficient,since not all species of wrasse have been sufficiently studied to ascertain if they are at sustainable conservation levels. Nor do we have sufficient local knowledge of wrasse stocks to know if local populations are genetically distinct, in which case removal from the wild for use on farms may represent unsustainable depletion of a distinct population.Since countries like Norway have set up large-scale wrasse-breeding projects, we believe that the Standard should be tightened up to specify that wrasse used as cleaner fish must be sourced from either (a) wild stocks which have been independently certified as being within sustainable conservation limits, on a local basis, and which have a quota system to regulate the removal of wrasse from the natural marine environment, or (b) wrasse which have been independently certified as being sustainably farmed. Any wrasse used as cleaner fish must be certified disease-free. The disease-free status must be constantly monitored.

Criterion 3.4

The SC should take into account the ongoing work of the EU-funded Prevent Escape research programme, which has already collected a huge amount of very valuable data.

Overall, the AST feels that this criterion leans too heavily on the use of arbitrary numbers of 'permitted' escapes during a farm's production cycle. The potential for serious adverse impact of escapes from marine pens will be dependent on not just absolute numbers but: age/size/developmental stage of escapees; time of year; location of farm in relation to salmonid river mouths.

We would stress once again that, in the case of already-fragile wild salmonid populations, the regular 'leakage' of a few farmed fish into the system may do much more damage than a high number of escapees in a single incident, even though the total of such 'leakage' may be within the limits permitted under the Standard. Again, local rivers need to be regularly monitored to assess the level of impact from such leakage.

In terms of footnote 38, we would point out that the requirements specified in the document fall short of the current legislation in Scotland, where not only all escapes but all SUSPECTED escapes have to be reported to the Government and to the local District Salmon Fishery Board within a specified time-period. At present, the Scottish Government publishes all escape figures on a public website, which includes the date, name of company, name of site, number & size of fish, and also the cause of the escape.

Footnote 40:

See also: *Fitness reduction and potential extinction of wild populations of Atlantic salmon, Salmo salar, as a result of interactions with escaped farm salmon*
Philip McGinnity, Paulo Prodöhl, Andy Ferguson, Rosaleen Hynes, Niall O Maoiléidigh, Natalie Baker, Deirdre Cotter, Brendan O'Hea, Declan Cooke, Ger Rogan, John Taggart, and Tom Cross
Proc Biol Sci. 2003 December 7; 270(1532): 2443–2450.

Section 8 : Standards for suppliers of smolt

Rationale:

'The introduction and amplification of parasites and pathogens, as well as the potential genetic effects of escapees, have been raised as particularly concerning in areas where native salmonids exist. For this reason, the draft SAD standards allow only closed or semi-closed smolt systems to be certified in areas of wild salmonids.'

We strongly support this ban on accreditation of smolt production in open net pens in areas of wild salmonids, and commend the SC's decision to leave this requirement within the Standard.

THE DEPARTMENT OF
AGRICULTURE, FISHERIES & FOOD
AN ROINN TALMHAÍOCHTA, IASCAIGH & BIA

A strategy for improved pest control on Irish salmon farms

May 2008

Executive Summary

Marine finfish production in Ireland grew steadily throughout the 1990s; production in 2001 reached a high point of 24,000 tonnes but declined to 13,318 tonnes by 2006, due in some part to a lack of profitability and consequent liquidity in the sector. 2007 saw a small increase in production levels to 13,800 tonnes. The Minimum Import Price (MIP), a trade correction measure introduced by the European Union in 2005, has stabilised farmed salmon prices in a market which was being distorted by below-cost-selling in the European market. The MIP has provided the Irish industry with an opportunity to trade its way back to prosperity and to a position where it can once again increase output. The Irish industry acts as an important socio-economic driver in a number of rural and coastal communities by providing a source of local employment both full time and seasonal.

Farmed salmon is now the most commonly eaten fish in Europe, because of its year round availability and its versatility from a culinary perspective.

The ecto-parasitic sea louse, a tiny crustacean, is an economically significant pest of the farmed salmon industry worldwide. It is important, both from a farm management point of view and in the context of possible negative interactions with wild migratory salmonid populations, that this pest be tightly controlled. Accordingly, a mandatory national sea lice monitoring and control regime regime which features so-called ‘treatment-trigger-levels’ has been put in place, which aims to keep the level of infestation on marine salmon farms as low as possible. Achieving the desired level of control of this parasite has proved to be a challenging proposition in some areas in recent years

The pest has shown itself to be very resilient and it has the ability to rapidly develop resistance to the limited range of veterinary medicines that are available to treat it. Levels of infestation were successfully controlled, by and large, through the 1990s, but since 2002/2003 it has been more difficult for the salmon farmers, despite their best efforts, to achieve the very low levels of infestation required by the national control programme. The causes of this difficulty are multifactorial and include: a succession of warm winter sea temperatures, resistance by the pest to the veterinary medicines, limited access to ‘fallowing sites’ for temporal and spatial separation of stocks and other complicating fish health problems.

The control of sea lice has been afforded a high priority by the State since 1991 and Irish salmon farms are the subject of a rigorous and transparent inspection regime carried out by the Marine Institute on behalf of the Government. This monitoring programme is backed up by mandatory licensing requirements imposed on fin-fish farmers through a protocol on management and control.

A Sea Lice Monitoring and Control Working Group was established by the then Department of Communications, Marine and Natural Resources in 2005, comprised of representatives of the Department, the Fisheries Boards, Marine Institute and an Bord Iascaigh Mhara to examine/review the systems and processes for controlling sea lice levels at marine finfish farms. The Group’s deliberations were wholly inconclusive and it was unable to reach any consensus on the way forward at the time of the transfer of aquaculture licensing functions to the Department of Agriculture, Fisheries and Food. Since the establishment of the new Department of Fisheries, Agriculture and Food (DAFF) the Department and the Marine Institute have continued to work on the issue of enhanced sea lice control.

The following report outlines a comprehensive range of measures to provide for enhanced sea lice control.

The report makes the following recommendations:

1. *A joint DAFF/industry working group to be established to identify “break out” site options in areas which have persistent sea lice problems. These options would include the possibility of using redundant sites, to optimise fallowing and separation of generations.*

2. *Effective and appropriate use of chemical intervention to be reviewed to take ongoing account of changing environmental conditions, developing farming practices, sensitivity of lice to treatments and fish health issues.*

3. *The increased availability of well boat capacity coming on stream in the industry to be utilised for controlled bath treatments.*

4. *The optimisation of product rotation for strategic treatments should be given further consideration as a matter of urgency.*

5. *BIM and the Marine Institute to engage in intensive consultation with the fish farming industry, both with individual fish farmers and representative organisations, to ensure ongoing optimisation of management practices and to report back to the Minister within four months.*

6. *BIM and the Marine Institute to immediately establish a working group to report in three months on the potential of alternative treatment approaches and to set out the steps necessary to introduce these approaches.*

7. *A national implementation group to be established comprising appropriate representation from:*

The Coastal Zone Management, Veterinary and Seafood Policy Divisions of the Department of Agriculture, Fisheries and Food;
An Bord Iascaigh Mhara;
Marine Institute; and
Industry representatives.

The group is to provide the Minister, within ***six*** *months of it's establishment, with a full update of the actual situation on the ground, the progress made to reduce sea lice levels and the further steps required, if any, to redress the situation.*

8*.* *A New role for SBM (Single Bay Management) as a focus for management cells to manage sea lice control at a local and regional level reporting to the national implementation group.*

Table of Contents

Section 1: Background

1.1. Marine Finfish Aquaculture in Ireland

In the global context, aquaculture has grown significantly over recent decades, with annual growth of the order of 10% since 1990. It is the fastest growing area of food production. The industry is also characterised by ongoing diversification and innovation, including the cultivation of new species.

Salmon farming started in Ireland commercially in or around 1978. The first significant company was Curraun Fisheries Ltd (at the time a wholly owned subsidiary of Guinnesss Ireland Plc). There was a debate for a few years as to which species (Atlantic salmon or Rainbow trout) would be the more suitable for cultivation, with salmon winning out eventually as their survival at sea was better and they fetched a higher price. Roughly 350 tonnes of farmed salmon were produced in 1980 at a value of about €2.6million (prices were very high at that time as the fish were a rarity).

Since its initial trial development in the early 1970s, the Irish industry has grown to become a significant contributor to local economies. The Irish aquaculture industry provides fulltime and part time employment for some 2,000 people and had a value in 2007 of €131m. Production of farmed salmon in 2007was estimated at 13,800 tonnes. BIM estimated that 410 people were employed in finfish farming during 2005, of which 247 were full-time.

Irish output, however, is tiny by international standards. By way of comparison the two main world producers of farmed salmon, Norway and Chile, accounted for production of approximately 670,000 tonnes RWE[1] and approximately 660,000 tonnes RWE respectively, in 2006. Scotland the nearest salmon farming country had an output of about 150,000 tonnes RWE in 2006. Thus the Irish sector is less than one eleventh the size of its nearest neighbour and about one fiftieth the size of its main competitors.

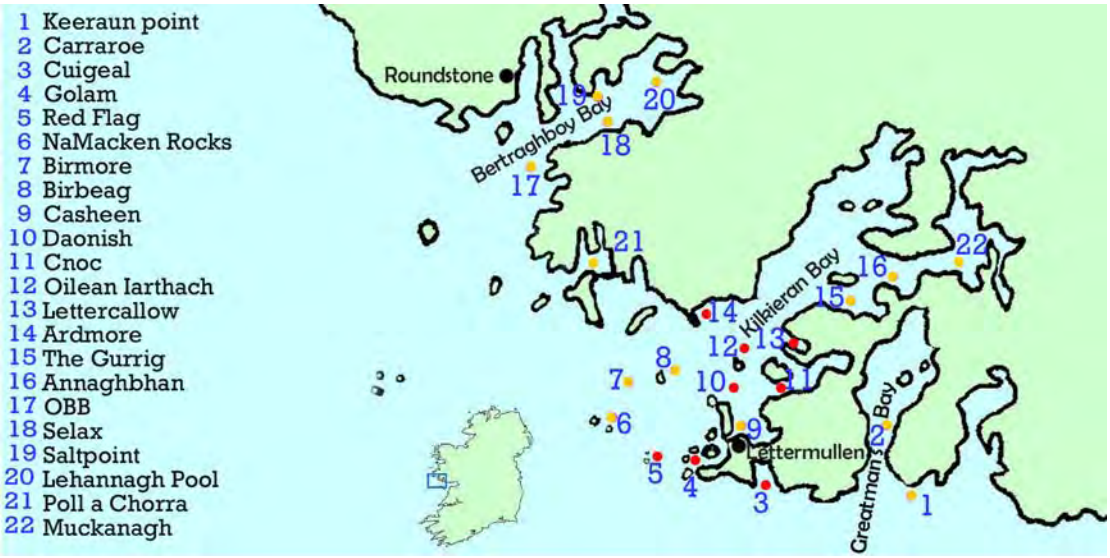
[1] Salmon production is given as Round Weight Equivalent – i.e. the harvest weight of the fish after is has been starved and bled.

There are three distinct regions in Ireland where marine salmonid farming is carried out, illustrated on the maps (courtesy of the Marine Institute)

below:

The West (Counties Mayo and Galway),

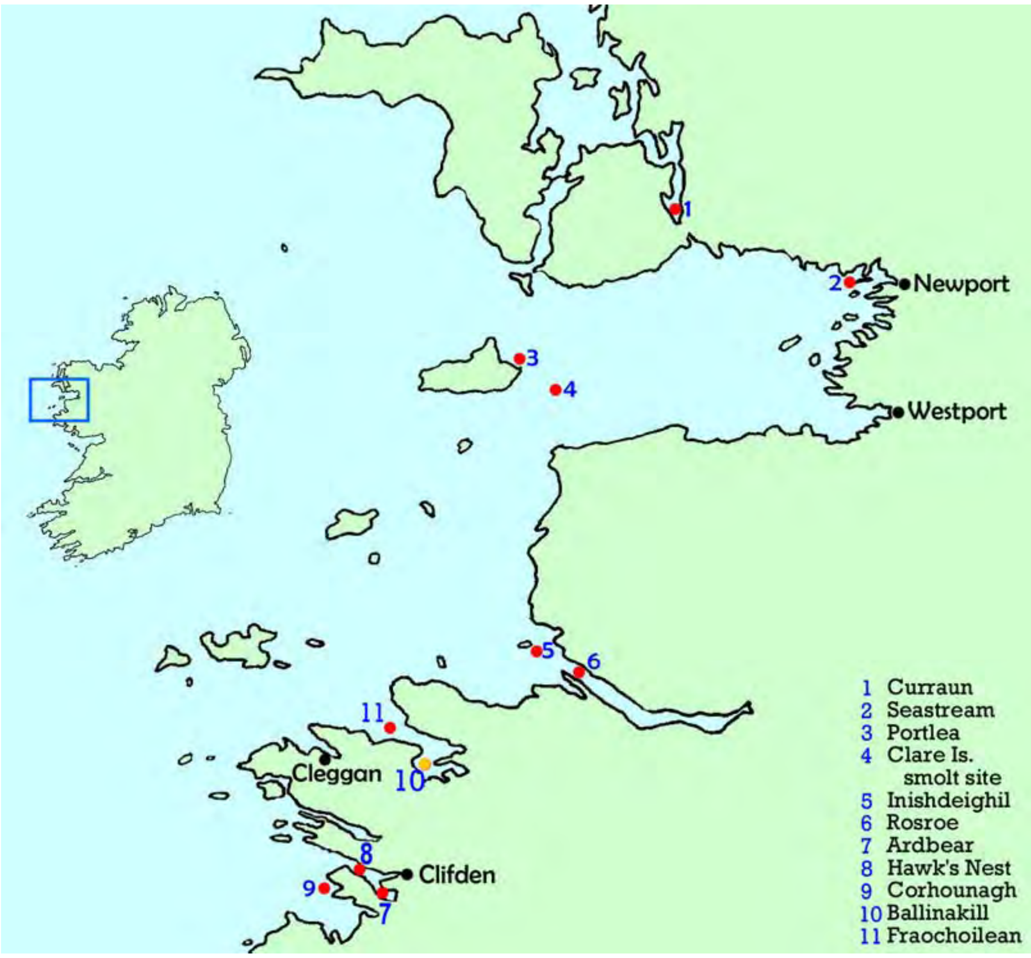
Salmon farm sites in south Connemara



Sites used in 2006= ● red

Sites not used in 2006= ●orange

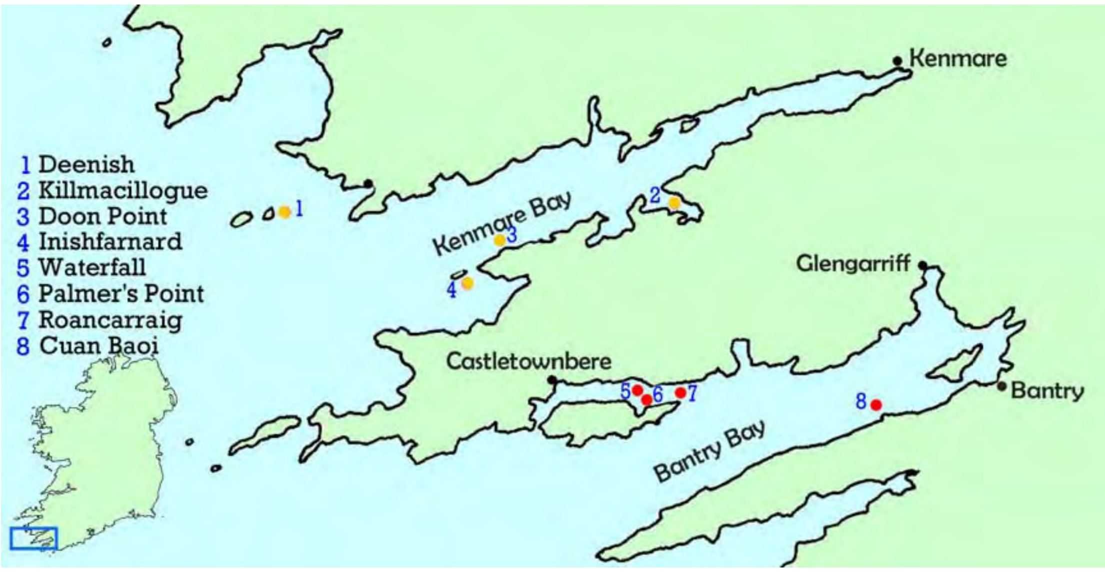
Salmon farm sites in Mayo and north Connemara



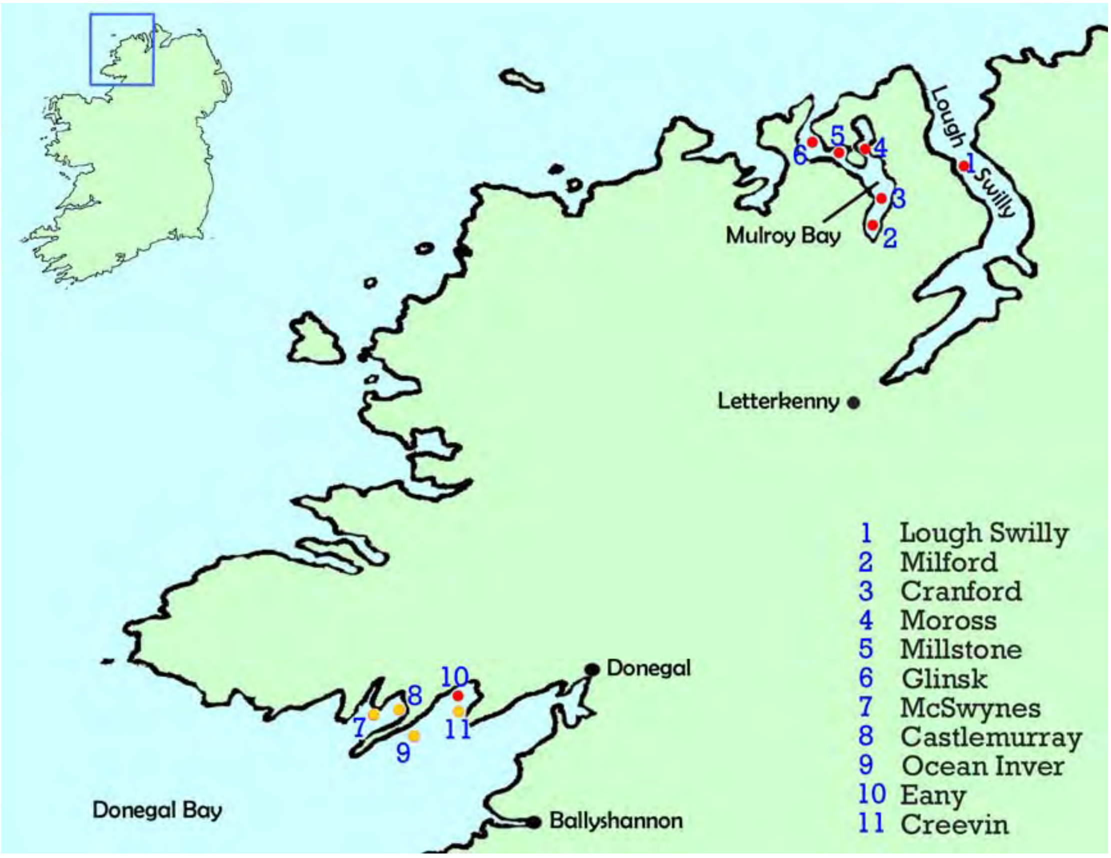
Sites used in 2006= ● red

Sites not used in 2006= ●orange

Salmon farm sites in the Southwest (Counties Cork and Kerry)



Salmon farm sites in the Northwest (Co. Donegal)



Sites used in 2006= ● red

Sites not used in 2006= ●orange

Finfish production in Ireland grew steadily throughout the 1990s; production in 2001 was as high as 24,000 tonnes but declined to c.12,000 tonnes by 2006[2]. The Cawley Report (*Steering a New Course – Strategy for a Restructured, Sustainable and Profitable Irish Seafood Industry 2007-2013*) identified market factors (salmon prices earlier this decade plummeted due to below cost selling) as the dominant cause for the decline. The European Union introduced Minimum Import Prices in 2005 and farmed salmon prices have stabilised significantly since then.

The Cawley Report also noted that sub-optimal stock performance due to fish health problems had also had a negative impact on the Irish industry. The report cites recent improvements in husbandry, stock breeding and feeding practices as the basis on which this issue is being addressed. The report acknowledges that in recent years the Irish industry has not been an attractive investment option, owing to the foregoing difficulties and also to shortcomings in the regulatory framework.

1.2 An Overview of the Challenges facing the industry

The biggest challenges facing the Irish salmon farming industry, as identified by the Cawley Report, revolve around the issues of public acceptance, proportionate regulation and the efficient control of pests and other fish health problems. At a national level, there is a concerted effort underway to streamline the regulatory arrangements and to engender a better understanding of the sector and its importance. At a local level, in many areas, the CLAMS process (Co-ordinated Local Aquaculture Management System) and the SBM (Single Bay Management) scheme approaches are being used to address these challenges.

Marine finfish farms are also perceived by anglers and wild fisheries interests to be problematic because of the proximity of some operations to river mouths and a concern over the possible impact on wild migratory salmonid fisheries. The Irish salmon farming industry has, for some time, expressed the need for

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[2] Browne R, Deegan B, O'Carroll T, Norman M and Ó Cinnéide M. 2007. **Status of Irish Aquaculture 2006**. Merc Consultants

the provision of more sites for fallowing and separation of generations purposes. However, new applications have been slow to come forward in recent years, possibly due to the complex nature of the licensing process and uncertainties associated with the aquaculture licence appeals process. However, there are a number of underutilised licensed sites which are thought to hold significant break out potential for current operators. The use of these sites by existing operators to separate generations of fish and facilitate better management practices has begun to emerge.

1.3 What are Sea Lice?

Sea lice are a group of parasitic copepods found on fish world wide. There are two species of sea lice commonly found on cultured salmonids in marine conditions around the coast of Ireland, *Caligus elongatus* Nordmann, which infests over eighty different species of marine fish, and *Lepeophtheirus salmonis* Krøyer (the salmon louse), which infests only salmon, trout and closely related salmonid species. *L. salmonis*, the salmon louse, is the more serious parasite on salmon, both in terms of its prevalence and effects. It has been reported as a common ecto-parasite of both wild and farmed salmon at sea.

Returning wild salmon have been found to carry an average of 10 or more adult egg bearing females on their return to the Irish coastline from their feeding grounds in the Atlantic. Having evolved their relationship with salmon and trout over many millennia, the parasite is extremely well adapted to target its host species and it is ubiquitous to all the coastal waters around Ireland and indeed throughout the range of the Atlantic salmon.

Salmon, whether wild or cultured, go to sea from fresh water free of sea lice and only pick up the infestation after they enter the marine phase of their lives.

1.4 What effect do sea lice have?

Sea lice infestations can have commercially damaging effects on cultured salmon. They inflict damage to their hosts through their feeding activity on the outside of the host's body. Sea lice affect farmed salmon stock by damaging the integrity of the fish’s epithelium, which impairs its osmoregulatory ability and leaves the fish open to secondary infections. The net effect of infestation, especially if it is left unchecked, is a reduced growth rate and an increased morbidity.

Sea lice and sea lice infestation of salmon have no implications for human health or seafood safety.

Section 2: Sea Lice Monitoring

2.1 Background

Monitoring of lice infestation levels on salmonid farms in Ireland was initiated in April/May 1991. This was in response to concerns that lice emanating from farmed salmonids might be implicated in the phenomenon of large numbers of sea trout returning to rivers in early summer in an emaciated state and with elevated lice numbers. Since April 1994, monitoring has been carried out in accordance with the recommendations of the Sea Trout Task Force and its successor body, the Sea Trout Management and Advisory Group.

The current national sea lice monitoring programme involves the inspection and sampling of each year class of fish at all fish farm sites 14 times per annum - twice per month during March, April and May and monthly for the remainder of the year except December-January. Only 1 inspection is carried out during this period.

In the early phases, the level of lice per fish that would trigger the need for treatment was set at a level of 2.0 lice per fish during the Spring period from March to May. These trigger levels have been tightened up over the years, however, as the monitoring and control programme has been developed and enhanced and incorporated into the existing Monitoring Protocol.

In 2000 this monitoring regime was formally adopted as one of a number of Monitoring Protocols to which all salmon farmers are required to adhere. The inspections are carried out directly by the Marine Institute (MI). This programme is applied at all marine finfish farms regardless of whether the licensee, through the terms and conditions of it's licence, is subject to the terms of the Protocol or not. The cooperation of the industry in this respect is noted. A copy of the Sea Lice Monitoring Protocol is attached at Appendix 1.

Lice levels are determined from the sampling process and measured against target levels set out in the protocol or in licences. The Spring period (March to May) targets are now set at very rigorous levels of 0.3 to 0.5 egg bearing (ovigerous) lice per fish. Outside of this a level of 2.0 egg bearing lice acts as the trigger for treatment. Where measurements at a farm exceed these target levels the MI issues a "Notice to Treat" to the licensee.

Results are reported to farms by the MI within five working days of the inspection together with appropriate advice. Monthly reports are compiled for each site of mean numbers of egg bearing lice and total mobile lice of each species. These reports are circulated to the farms, the Department, the Marine Institute, the Central Fisheries Board, the Regional Fisheries Boards, the Irish Salmon Growers Association, Save Our Seatrout and the Western Gamefishing Association. This ensures that real time information on the levels pertaining on farms is available to all interested parties. These reports are designed to give a clear, unambiguous measure of the infestation level at each site and to act as a basis for management decisions.

2.2 Purpose of Monitoring

The initial purpose of the monitoring in 1991 and 1992 was to obtain an objective assessment of infestation levels on farms and to investigate the nature of these infestations. The results of these investigations, first published in 1993, were used to develop a management strategy for effective sea lice control and subsequently to refine and further enhance the management strategy. The purpose of the national sea lice-monitoring plan since 1994 has been:

- *To provide an objective measurement of infestation levels on farms*
- *To investigate the nature of the infestations*
- *To provide management information to drive implementation of the control and management strategies*
- *To facilitate further development and refinement of the control and management strategies.*

2.3 2007 Trends

Appendix 2 contains key information on sea lice infestation during 2007. The statistics in the tables are presented on a site by site and regional basis. For the purposes of this report the key issues to note are as follows:

2005 salmon

Only 4 sites (west & north—west) contained two sea winter salmon (i.e. salmon that had been at sea during winter 05/06 and winter 06/07) in 2007. Of these 4 sites, 3 sites had 100% of samples above the trigger levels on inspection. The number of such inspections is small however as these fish were harvested by March 2007 at the latest.

2006 salmon

South-West

- only 1 site (Roancarraig, Bantry Bay) was stocked
- all 6 samples in the critical spring period exceeded the treatment trigger levels
- sea-lice levels continued to increase during the critical period, notwithstanding the application of treatments

West

- there was a further reduction in the number of sites stocked in 2007 (11) compared with 2006 (18)
- of the 11 sites, on 4 sites 100% of the inspections in the critical period were above the trigger level, while one site was harvested out before the spring period
- of the remaining 6 sites, 4 sites had 50% or more of results of inspections above the trigger level in the spring period
- only one site was below the trigger level on all inspections in the spring period

- overall, outside the spring period, 35% of inspections showed results which were above the higher trigger level.

North-West

- 5 sites were stocked in 2007 compared with 6 in 2006
- the only site in Lough Swilly was below trigger levels on all inspections carried out during the spring period
- the 4 sites in Mulroy Bay exceeded trigger levels on 50% of inspections in the spring period
- despite higher trigger levels outside the spring period, taking the 5 sites together, there was the same incidence of exceeding the trigger levels outside the spring period as within the spring period
- the most significant feature in the north west was the continuing escalation in sea lice levels towards the end of 2007.

Monthly Mean Trends

The monthly mean sea lice figures show all 3 regions as exceeding the trigger levels throughout the spring period. Outside the spring period the experience varies but towards the latter half of 2007 both the West and north-West exhibited levels generally in excess of trigger levels.

Treatments

M.I. advise that all farms cooperate with regard to carrying out treatments on foot of notice to Treat. Notices are issued in all cases where trigger levels are exceeded. However, a key feature appears to be that re-infestation occurs relatively soon after treatment and this may raise issues as regards the efficacy of treatments and or the need for more coordination of treatments between adjacent cages and sites.

2.4 Annual Trends

L. *salmonis* ovigerous (egg-bearing) and mobile lice level trends for one-sea-winter salmon in the month of May from 1991 to 2007 are compared respectively in Figures 3 and 4 of the Marine Institute report at Appendix 2. (For ease of reference Figures 3 and 4 are reproduced hereunder.) The mean number of ovigerous lice per fish, and the mean number of mobile lice per fish are presented.

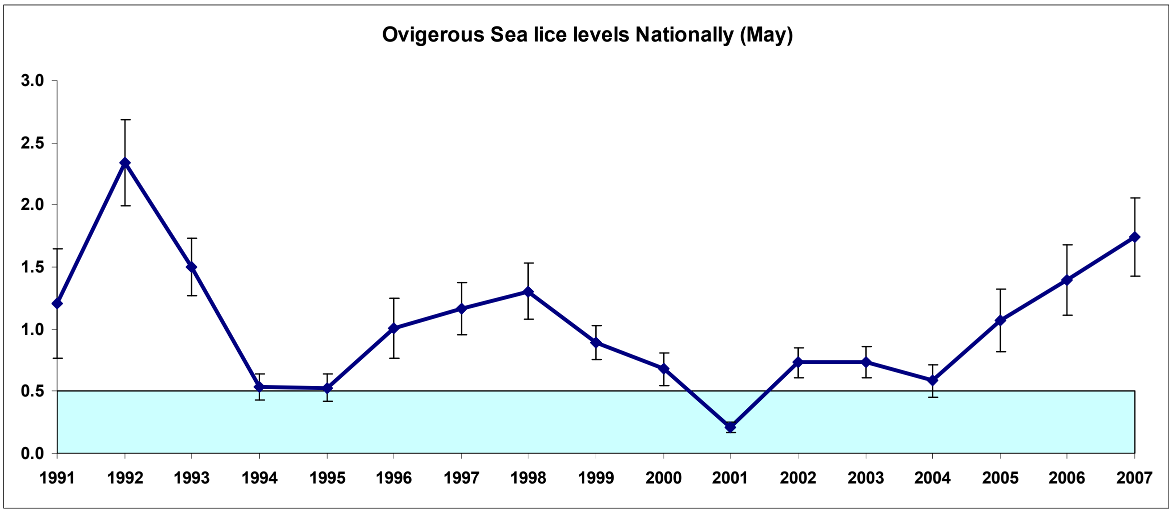


Figure 3. Annual trend (May mean) (SE) ovigerous *L. salmonis* on one-sea-winter salmon. (Blue shaded area represents the treatment trigger level during spring period.)

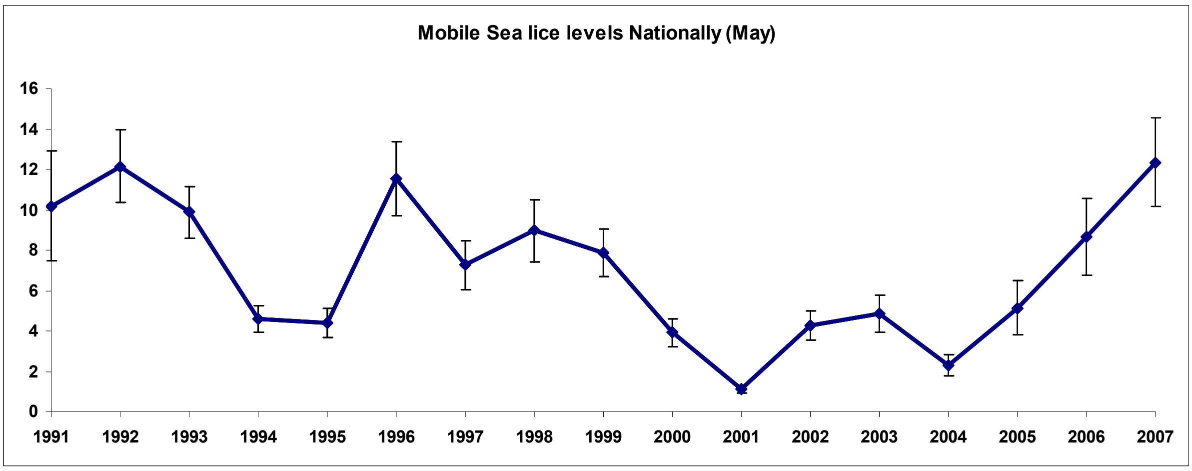


Figure 4. Annual trend (May mean) (SE) mobile *L. salmonis* on one-sea-winter salmon.

From 1998 to 2001 the levels decreased steadily for both ovigerous and total mobile lice. Mean ovigerous L. salmonis levels increased in 2002, remained steady in 2003 and show a slight decrease again in 2004.

In 2005 and 2006 levels increased and this trend continued in 2007. The mean ovigerous lice level for one sea winter salmon in 2007 is the second highest since monitoring commenced. Only 1992 is higher. Mean mobile levels increased from 2001 to 2002 and again from 2002 to 2003 but show a reduction in the 2004 figure. Levels increased in 2005 and again in 2006 and 2007. Mean mobile lice levels for one sea winter salmon in 2007 are the highest recorded to date.

The reasons for the increase are complex and have been outlined elsewhere but the trend underlines the necessity for a concerted effort to control lice infestations coming into the 2008 season.

Since 1991 the mean sea lice count for one sea winter salmon has only once (2001) been below the trigger level while in 1994/95 the count bordered on the trigger level.

While there are encouraging signs in the winter and early 2008 sealice inspection data, as a result of action by farms, March sea lice inspections resulted in a total of 11 sites being issued with notices to treat because they were above the trigger levels. This underscores the fact that it will take a concerted effort to achieve a sustained improvement in lice control in 2008. the Inspection results for March are appended (Appendix 3) to this Report.

2.5 Management Strategy

As a result of the experience gained over a number of years an integrated approach to sea lice control has been developed in Ireland. This management strategy was endorsed by the Sea Trout Task Force and subsequently, by the

Sea Trout Management and Advisory Group. This management strategy, which formed the basis for Single Bay Management (SBM) Agreements, relies on five principal components:

- *Separation of generations*
- *Annual fallowing of sites*
- *Early harvest of two sea-winter fish*
- *Targeted treatment regimes*
- *Agreed husbandry practices*

Together, these components are intended to reduce the development of infestations and to ensure the most effective treatment of developing infestations. They are intended to minimise lice levels whilst controlling reliance on, and reducing use of, veterinary medicines. The separation of generations and annual fallowing prevent the vertical transmission of infestations from one generation to the next, thus retarding the development of infestations. The early harvest of two sea winter fish removes a potential reservoir of lice infestation and the agreed practices and targeted treatments enhance the efficacy of treatment regimes. One important aspect of targeted treatments is the carrying out of autumn / winter treatments to reduce lice burdens to as close to zero as practicable on all fish, which are to be over-wintered. This ensures zero / near zero egg bearing lice in spring. This is the so called “critical period” for lice control. It is an important time as strategic control at this point can enhance lice control for the succeeding months by interrupting the cycle of infection before the warming water temperatures increase the speed of lice reproduction. It is also the most important period in terms of wild farmed interactions. The agreed husbandry practices cover a range of related fish health, quality and environmental issues in addition to those specifically related to lice control.

2.6 Trigger Levels for Treatment

The setting of appropriate treatment triggers is an integral part of implementing a targeted treatment regime. Treatment triggers during the spring period [March to May] are set close to zero in the range of from **0.3 to 0.5** egg bearing females per fish and are also informed by the numbers of mobile lice on the fish. Where numbers of mobile lice are high, treatments are required even in the absence of egg bearing females.

Outside of the critical spring period, a level of **2.0** egg bearing lice acts as a trigger for treatments. This is only relaxed where fish are under harvest. Over the period since the initiation of SBM (Single Bay Management), treatment triggers have been progressively reduced from a starting point of 2.0 per fish during the spring period to the current levels which are **0.5** egg bearing lice per fish. Triggered treatments are underpinned by follow up inspections and, where necessary, by sanctions. Sanctions employed include, peer review under the SBM process, conditional fish movement orders and accelerated harvests.

In late winter and early spring sea water temperatures are at a minimum and development rates of lice are reduced. This has the effect of tending to synchronise the development of lice larvae. A strategic treatment at this time can break the cycle of infection.

Ovigerous female lice are those which produce the infective larvae and treatments are timed to remove adult females before they can release larvae. Setting the treatment trigger at 0.5 ovigerous lice per fish ensures that treatments are carried out when a maximum of half of the fish examined have any ovigerous lice. This is the optimum time to interrupt lice development. Later in the year generations of lice are not as synchronised and intervention, at a lice level of 0.5 ovigerous lice per fish, by way of treatment is generally not justified. A level of 2.0 ovigerous lice per fish has been shown to be a pragmatic level at which intervention by way of treatment is advisable. Levels of total mobile lice or juvenile lice are important in advising fish health professionals in developing a lice control strategy. However, they are not of themselves appropriate measures upon which to trigger mandatory treatments.

2.7 Sampling Strategy

The Irish sampling strategy, which underpins the current monitoring programme, was developed through a consultation process with national and international experts in the field. It has been refined and modified as a result of the recommendations of the Sea Trout Working Group, the Sea Trout Task Force and the Sea Trout Management and Advisory Group. The resulting programme meets both the exacting scientific requirements of a national monitoring programme and the diverse concerns of sectoral interests, as expressed through the various Ministerial committees and through direct representations. The rationale of the current sampling strategy is to:

- *Provide a robust and reliable objective measure of lice numbers on farmed fish*
- *Operate within a framework which is cost effective and capable of being carried out over the range of installations which are in use in offshore farming*
- *Take account of weather conditions, fish health issues, environmental effects and animal welfare considerations.*

Section 3: Co-ordinated Management Systems

3.1. Single Bay Management

On the basis of information gathered in surveys of lice infestation on salmon farms in 1991 and 1992, the Department of Marine put in place a new initiative in salmon farm management. This initiative, termed Single Bay Management, has been progressively introduced since then and has been shown to have a beneficial effect in lice control on farmed fish. It involves all of the farms in an area co-operating to develop an integrated management plan. Crucial elements in the success of this plan are identified as:

- *separation of generations;*
- *annual fallowing of sites;*
- *strategic application of chemotheraputants;*
- *good fish health management; and*
- *close co-operation between farms.*

3.2. CLAMS

In 1998 the Minister of State for Marine announced the setting up of a Co-ordinated Local Aquaculture Management System group (CLAMS). This concept of management is designed to facilitate the development of plans for individual bays incorporating and extending the concept of Single Bay Management. It will also be integrated with Coastal Zone Management policy and County Development Plans. Though CLAMS is integrated with these plans and the viewpoints of all interest groups are documented, the process is driven by the aquaculture producers working within the framework of national policy. BIM and the Marine Institute have been charged with the responsibility for developing the CLAMS framework at local level.

The CLAMS process is a non-statutory management system, which is anchored in the national marine policy and development programmes. It is envisaged that CLAMS will highlight issues in a bay and co-ordinate the industry and relevant bodies to deal with them. It is separate to the licensing process and is not intended to solve or take responsibility for all issues. The concept focuses at local bay level while still taking on board relevant national policies. The object of this process is to formulate a management plan for the bay, which incorporates and extends the concepts of Single Bay Management to all farmed species.

CLAMS provides a concise description of the bay in terms of physical characteristics, history, aquaculture operations, future potential, problems, etc. It also allows various Codes of Practice to be customised and integrated to the aquaculture industry operating in the bay. In addition, it provides the framework from which a management and development plan for aquaculture in the bay can be drawn. Another important aspect is that this process acts as a focus group for the community. This will then provide an information channel from local to national level and vice versa. It is envisaged that this will provide a framework for addressing issues that affect or are affected by aquaculture activities and streamline the resolution of these situations.

3.3 Fallowing

Fallowing is a tool used to control the level of sea lice, benthic conditions and the spread of fish disease. To be effective it is dependent on a satisfactory length of time for fallowing and appropriate geographical separation between sites and/or synchronous fallowing of adjacent sites.

The Protocol on Fallowing essentially establishes the principle of fallowing and best practice in fallowing.   All finfish farms **subject to the Protocol** are obliged to undertake appropriate fallowing for the control of disease and parasite problems (including sealice). Where there is more than one finfish farm in a particular bay the protocol requires licensees to pursue fallowing in the context of the Single Bay Management process. The Protocol specifies a minimum period of 30 continuous days for fallowing an individual site, although, in many cases, the conditions of a licence go beyond this in respect of particular locations. **Not all licences are subject to the Protocol on fallowing or, indeed, contain specific conditions on fallowing (a number of licences would predate the establishment of the Protocols).**

A key issue for licensed farms within their licensed areas is the lack of availability of sufficient sites to allow for effective fallowing. On a general level there is a balance to be met between a farm seeking to maximise its commercial return from the sites available to it while at the same time observing the requirement to fallow sites if single bay management, sea lice control and fish health management efforts are to be maximised. The balance between these potentially conflicting objectives has not assisted the sea lice control strategy.

The current situation whereby a large number of sites remain unstocked may afford the opportunity for a greater fallowing effort, largely through cooperation between licensees. In the medium term a more mandatory and enforcement approach to fallowing may be called for.

In this regard one of the recommendations of the Cawley Report should be noted viz:

> *"The DCMNR should support and facilitate the acquisition of fallowing sites for the salmon farming sector to assist with more effective sealice and disease control. Provision of these sites should not necessarily involve an increase in the permitted output of the industry, but should facilitate improved spatial and temporal stock management and reduced incidence of disease. This initiative, which could make a very valuable contribution to the national effort to control sealice numbers, should involve the applicants and the agents of DCMNR entering into detailed consultation on the location of proposed fallowing sites and agreeing binding stock rotation and fish health management protocols prior to the submission of applications for aquaculture licensing. The properly completed application, whose 'pro-bono' credentials should be made known to all of the statutory consultees, should then be processed as fast as possible through the system, without any compromise to the rigour and transparency of the Fisheries Amendment Act, 1997, but*

yielding a speedy outcome in terms of an appropriate licensing recommendation to the Minister to either grant or refuse the application."

Section 4: The Problem in Context

4.1 Best Practice

Over the last three seasons there has been a problem with lice control at a number of locations. In order to address this development a series of basic principles were developed as part of previous attempts to address the sea lice issue. These following 7 basic principles of best practice achieved a wide measure of agreement amongst all interested parties.

Seven Basic Principles

1) *Complete separation of Generations (sites to be one tidal excursion apart).*

2) *Each site to be fallowed annually, or at end of a production cycle, for one month (30 days) before re-stocking. All sites within one tidal excursion to be fallowed synchronously.*

3) *Annual synchronous "winter" lice treatment for all adjacent sites (one tidal excursion).*

4) *Planned rotation of sea lice treatments over the production cycle & adjacent sites to use the same product rotation.*

5) *Treatment triggers Spring Period 0.5 egg bearing females per fish, rest of year 2.0 egg bearing lice.*

6) *All above to be set out as part of formal signed SBM Agreement.*

7) *Where there is a persistent problem with sea lice control there is a need for an incremental series of actions up to and including mandatory treatments and sanctions where these are not effectively implemented.*

4.2 Causes of Current Difficulty

The potential causes/contributory factors which have led to the recent difficulties in maintaining good control of infestations can be summarised as follows:

- Poor farm management in carrying out lice control measures.

- Husbandry problems in administering lice treatments/poor inclusion rates for in-feed treatments.

- PD (pancreas disease) related issues (poor appetite and/or poor uptake of active ingredient in lice treatment) from diet

- Reduced sensitivity in sea lice populations to certain available treatments.
- Incomplete separation of generations leading to vertical transmission of lice.

- Additional lice treatments required by low trigger levels in protocols.

4.3 Potential Alternative Method of Treatment

There has certainly been an issue with inclusion rates for in-feed treatments. The effects of Pancreas Disease on appetite are well known (this has a direct effect on the up-take of in feed treatments) but there are other less well studied effects of the disease which may also impair the efficacy of in feed treatments. Taken together the above has undoubtedly had a significant impact on the efficacy of in feed lice treatments.

There is growing evidence that some populations of lice may be exhibiting reduced sensitivity to certain lice treatments. The loss of efficacy associated with in-feed treatments and the changes in farming practices, whereby cages have gotten larger and site locations have tended to be in more exposed areas, have made the problem of lice control more difficult. Using bath treatments in these circumstances is problematic and often unsuccessful despite the best efforts of the grower.

The use of Very Large Live Fish Carriers (VLLFC) ships, also called well-boats, is now the option preferred of the industry, as these vessels can treat an entire cage at a time and can achieve very precise dose rates in a controlled environment. They are however expensive to charter and can be difficult to obtain, especially if there is a lot of demand for their services in their home countries as is currently the case.

The key issue appears to be access to well boats and how this is to be achieved would need very careful consideration from a Value for Money perspective as, e.g. purchasing a vessel could prove costly and perhaps may not be ideal for future needs.   However, this is an issue that is being grasped by the industry and improved well-boat availability is coming on stream.

Health professionals have expressed concerns from time to time about additional treatments required to reduce lice levels, which were not having an adverse impact on the stock, to comply with trigger levels. This is especially a factor where fish health is already compromised due to other factors (*e.g.* PD, high temperatures etc). The need to carry out extra treatments is exacerbated where there is mixing of generations on the same or adjacent sites and/or integrated or strategic lice management is not the norm.

4.4 Review of lice control methods

Treatments Licensed in Ireland

Treatment	Purpose	Usage
SLICE	Emamectin Benzoate (in feed)	widely used
EXCIS	Cypermethrin (bath)	widely used
CALICIDE ECTOBAN	insect growth regulator Similar active ingredient (in feed)	no longer available available AR16 (special licence)
ALPHAMAX	Deltamethrin (bath)	available under special licence for use where other treatments are not effective or have limited efficacy.

Treatments Licensed or available elsewhere

Treatment	Purpose	Usage
Deltamethrin (*Alphamax*)	Bath	effective & widely used in Norway
Hi-cis Cypermethrin (*Betamax*)	Bath	as above
Salmosan (azamethiphos)	Bath	licensed in UK no longer available
Ivermectin	in-feed	licensed for other food animals in EU/Ireland

Other (alternative) lice "control" methods

Treatment	Usage
Wrasse	Used as a "cleaner fish" in several countries, including Ireland. Still used in Norway. Serious limitations to efficacy. Also issues with supply of wrasse, effects on wild populations and possible disease risks. May have limited application especially on post smolts in their first summer at sea.
Immuno-stimulants	e.g. Ecoboost (blend of aromatic herbs) feed additive, said to enhance ability of fish to withstand lice infection. May have part to play in integrated lice management plan. It is not of itself an effective way of controlling existing lice infestations.
Hydrogen Peroxide	Bath treatment. Issues with safety & practicality for treatments above 12^{o} C.

4.5 Solutions / Response Options

In seeking to address the current problems a number of approaches are required. In the short term it will be necessary to tackle the problem of severe infestations at certain sites, some of which may be experiencing reduced sensitivity to currently available medicines. This will have to be tackled on a bay by bay rather than a site by site or company basis to ensure that the extent of the management response is appropriate to the biological area of impact of the infective stages of the pest. In the short to medium term it will be necessary to review management practices to optimise lice control and to integrate it with overall health management, again on a bay by bay basis.

Three strategies are listed below which need to be addressed to ensure effective sea lice management on Irish salmon farms. Each of the strategies presents its own particular challenges, however as a suite of responses they provide the best way forward in the current circumstances.

A. Availability of a suite of novel lice treatments & methods (including VLLFC/wellboat)

- *For use on those sites where remedial action is urgently required.*
- *For use on sites where reduced sensitivity has been demonstrated or is suspected to traditional treatments.*
- *In particular, VLLFC are a key to effective use of bath treatments on exposed sites or those with large cages*

B. Full implementation of Site Management /Bay Management

- *Fallowing between generations*
- *Single Generation sites*
- *All in all out bay by bay strategies in specific cases*
- *Flexible and/or novel approach to use of currently licensed sites, including the species to be cultured at those sites.*

C. Enhanced role for SBM;- Integration of sea lice and health management protocols to include a bay management approach which is:

- *Defined by specific targets and goals.*
- *Goal led.*
- *Flexible and enforceable.*

Section 5: Conclusions

The solution most likely to have the best medium and long term results is a combination of all three response options set out in section 4.4. A flexible, inclusive approach can be achieved by continuing to adapt management practices at site and bay level to emerging trends in sea lice control.

In an effort to optimise management practices with regard to sea lice control at fish farms there have been a number of *ad hoc* initiatives including, the setting up of a small working group comprising Irish Salmon Growers Association and the Marine Institute. This group has met regularly over the last few months to improve co-ordination of efforts to achieve optimum benefit from the fish farmers control efforts. The enhancement of this approach through the formation of a management cell approach involving farmers, state agencies and DAFF at a local regional level would underpin a focussed SBM approach to addressing the ongoing management of sea lice control.

There appears to be an emerging consensus that “break-out” space is necessary to facilitate fallowing and separation of generations. This gives rise to a number of challenges including:

- *limited availability of space for new sites;*
- *access to existing licensed areas for fallowing purposes;*
- *environmental and other licensing constraints;*
- *potential objections from a variety of interested parties.*

Section 6. Recommendations and Action Plan

1. *A joint DAFF/industry working group to be established to identify "break out" site options in areas which have persistent sea lice problems. These options would include the possibility of using redundant sites, to optimise fallowing and separation of generations.*

In accordance with the Steering a New Course report, (Strategy for a Restructured, Sustainable and Profitable Irish Seafood Industry 2007-2013 (Cawley N, Murrin J and O'Bric R, 2006)) DAFF should "support and facilitate the acquisition of fallowing sites for the salmon farming sector to assist with more effective sea lice and disease control. Provision of these sites should not necessarily involve an increase in the permitted output of the industry, but should facilitate improved spatial and temporal stock management and reduced incidence of sea louse infestation and other diseases.

This initiative, which will make a very valuable contribution to the national effort to control sea lice numbers, should involve the applicants and the agents of DAFF entering into detailed consultation on the location of proposed fallowing sites and agreeing binding stock rotation and fish health management protocols prior to the submission of applications for an aquaculture licence." **It is very important that where break out space is made available it should be used by the industry for fallowing and separation of generations and not merely to enable an increase in output.**

2. *Effective and appropriate use of chemical intervention to be reviewed to take ongoing account of changing environmental conditions, developing farming practices, sensitivity of lice to treatments and fish health issues.*

In particular, the development of efficient protocols and mechanisms for the sourcing and use of well boats (VLLFCs) for controlled bath treatments and for the optimisation of product rotation for strategic treatments should be pursued by BIM in close consultation with the industry and the MI.

3. *The increased availability of well boat capacity coming on stream in the industry to be utilised for controlled bath treatments.*

4. *The optimisation of product rotation for strategic treatments should be given further consideration as a matter of urgency.*

5. *BIM and the Marine Institute to engage in intensive consultation with the fish farming industry, both with individual fish farmers and representative organisations, to ensure ongoing optimisation of management practices and to report back to the Minister within four months.*

6. *BIM and the Marine Institute to immediately establish a working group to report in three months on the potential of alternative treatment approaches and to set out the steps necessary to introduce these approaches.*

7. *A national implementation group to be established comprising appropriate representation from:*

- *The Coastal Zone Management, Veterinary and Seafood Policy Divisions of the Department of Agriculture, Fisheries and Food;*
- *An Bord Iascaigh Mhara;*
- *Marine Institute; and*
- *Industry representatives.*

The group is to provide the Minister, within ***six*** *months of it's establishment, with a full update of the actual situation on the ground, the progress made to reduce sea lice levels and the further steps required, if any, to redress the situation.*

8. *A New role for SBM (Single Bay Management) as a focus for management cells to manage sea lice control at a local and regional level reporting to the national implementation group.*

Efforts should be intensified to revitalise the single bay management approach and make it central to national policy for sea lice management.

In this regard it is proposed that a new feature of the strategy to enhance the control of sealice infestations on Irish salmon farms should be the creation of an integrated mandatory "real time" management regime, which will vigorously deal with failures to control sealice infestations on a case-by-case basis. One of the perceived shortcomings of the current arrangements is that they are not sufficiently proactive in dealing with situations where, despite attempts to treat, the sealice infestation is not brought adequately under control.

The rationale behind this new initiative is to bring all of the relevant State expertise to bear on problem situations in real time, actively engaging the affected farmer and ensuring that a high priority is given to dealing with the infestation by all concerned.

The regime is designed to bring progressively tougher actions to bear on the infestation to ensure the highest possible level of compliance.

The structure and *modus operandi* of this new more vigorous regime are set out below:

- Following established best practise for environmental management, a bay *management cell* approach will be taken to the problem of controlling sealice infestations on individual farms, where despite attempts to treat, the level of infestation has not been brought under control.
- Each bay where salmon farming takes place, will have a contingency *management cell* formed and available for immediate action. The cell shall consist of appropriate representation from the Marine Institute Sealice Monitoring Programme, Bord Iascaigh Mhara, an industry

representative from the *Single Bay Management Group* for the bay and a veterinary surgeon of record.

- The cell will be convened by the Marine Institute Sealice Monitoring Programme representative when a *"notice to treat"* has been issued to a farmer in the bay, followed by an inspection which determines that either the *"notice to treat"* was not acted upon, or that the attempted treatment did not prove successful.

- The cell will take into account *inter alia* such factors as the time of the year relative to the so called *critical period* and the spatial location of the affected farm in determining the relative urgency of its responses and the speed at which it ratchets up its responses.

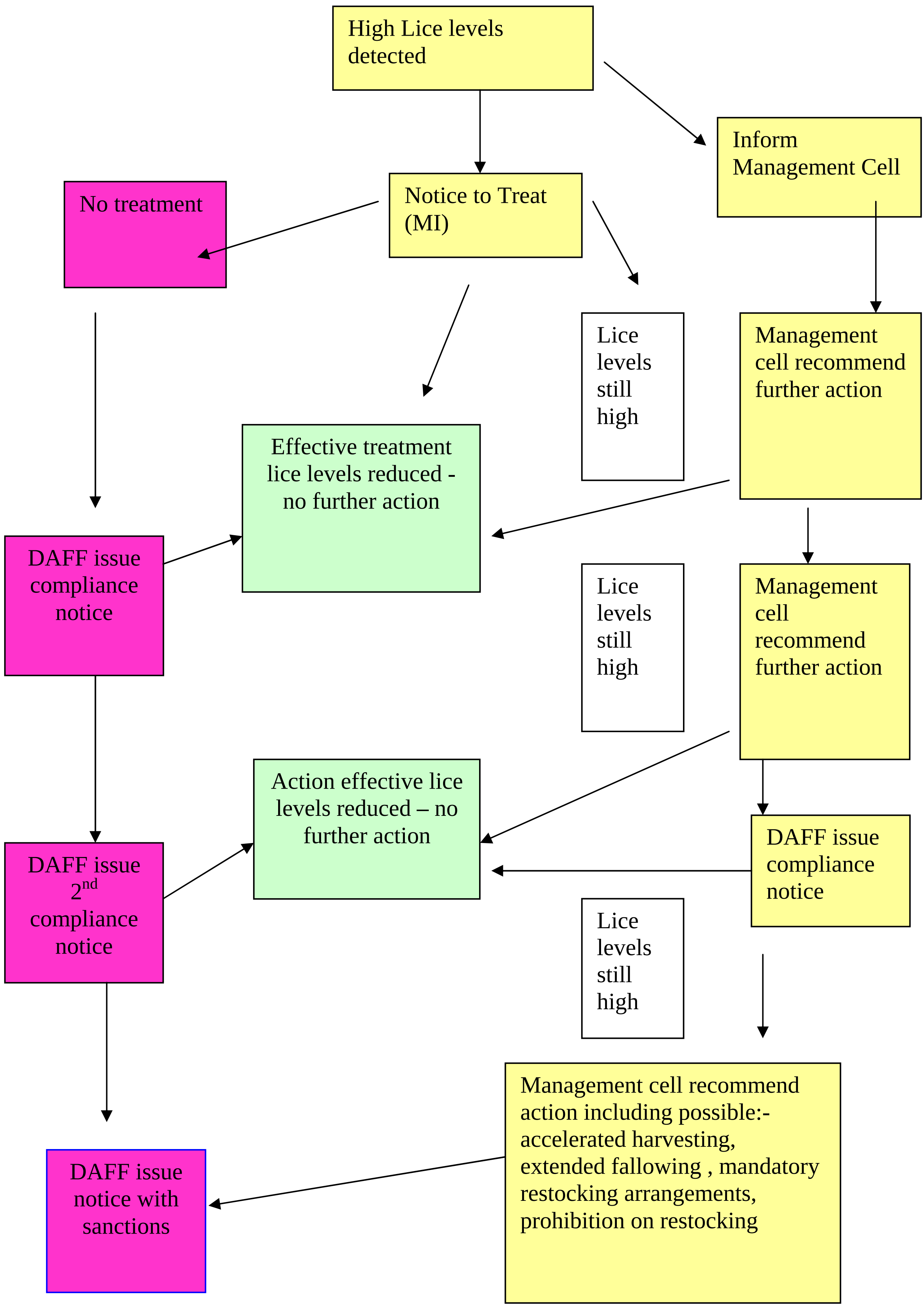
- The cell will attempt to convene within 72 hours of the meeting being called by the Marine Institute and it will meet with the farmer concerned, and review all pertinent data and facts. The MI representative shall act as the chair of the cell. The cell will then issue a recommendation for *further action*. The farmer concerned will be obliged to follow the *further action* recommendation of the sealice management cell, insofar as humanly possible.

- The *further action* recommendation from the cell shall be time specified and will be set down in writing and copied to the CZMD of the DAFF at the conclusion of the cell meeting or as soon as possible thereafter.

- Once the recommended course of action has been pursued, a further inspection will take place as soon as possible, and the results will be disseminated to the cell members. Depending on the relative success achieved, the cell may decide that no further action is required or that a further meeting and that a *further action* recommendation is needed. The subsequent *further action* recommendation of the cell shall also be mandatory and shall also be copied to the CZMD of the DAFF.

- Courses of action open to the cell for recommendation to the affected fish farmer, shall include selection of treatment medicine and the selection of treatment methodology. If after a number of attempts satisfactory control has not been achieved the cell may move to recommend accelerated harvesting, followed by extended fallowing post-harvesting. In exceptional circumstances the cell may also recommend mandatory restocking arrangements and/or an indefinite prohibition on restocking.

- The flow chart outlining the operation of the cell is set out below.


High Lice levels detected
Inform Management Cell
No treatment
Notice to Treat (MI)
Lice levels still high
Management cell recommend further action
Effective treatment lice levels reduced - no further action
DAFF issue compliance notice
Lice levels still high
Management cell recommend further action
Action effective lice levels reduced – no further action
DAFF issue compliance notice
DAFF issue 2nd compliance notice
Lice levels still high
Management cell recommend action including possible:- accelerated harvesting, extended fallowing , mandatory restocking arrangements, prohibition on restocking
DAFF issue notice with sanctions

Appendices

Department of the Marine and Natural Resources
Roinn na Mara agus Acmhainní Nádúrtha

Monitoring Protocol No. 3

for

Offshore Finfish Farms-
Sea Lice Monitoring and Control

(subject to revision from time to time)

11 May, 2000

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for
Offshore Finfish Farms -
Sea Lice Monitoring and Control

1. Monitoring Regime Required

All finfish farms are obliged to monitor for sealice on an ongoing basis and to take remedial action. This involves the inspection and sampling of each year class of fish at all fish farm sites fourteen times per annum, twice per month during March, April and May and monthly for the remainder of the year except December-January. Only one inspection is carried out during this period.

2. Purpose of Monitoring

The four purposes of the National Sea Lice-Monitoring Plan are:

- To provide an objective measurement of infestation levels on farms
- To investigate the nature of the infestations
- To provide management information to drive implementation of the control and management strategies
- To facilitate further development and refinement of the control and management strategies.

3. Monitoring and Control Strategy

The sea lice monitoring and control strategy has five principal components:

- Separation of generations
- Annual following of sites
- Early harvest of two sea-winter fish
- Targeted treatment regimes, including synchronous treatments
- Agreed husbandry practices

Together, these components work to reduce the development of infestations and to ensure the most effective treatment of developing infestations. They minimise lice levels whilst controlling reliance on, and reducing use of, veterinary medicines. The separation of generations and annual following prevent the vertical transmission of infestations from one generation to the next, thus retarding the development of infestations. The early harvest of two sea winter fish removes a potential reservoir of lice infestation and the agreed practices and targeted treatments enhance the efficacy of treatment regimes. One important aspect of targeted treatments is the carrying out of autumn / winter treatments to reduce lice burdens to as close to zero as practicable on all fish, which are to be over-wintered. This is fundamental to achieving zero / near zero egg bearing lice in spring. The agreed husbandry practices cover a range of related fish health, quality and environmental issues in addition to those specifically related to lice control.

4. Trigger Levels for Treatment

The setting of appropriate treatment triggers is an integral part of implementing a targeted treatment regime. Treatment triggers during the spring period are set close to zero in the range of from **0.3 to 0.5** egg bearing females per fish and are also informed by the numbers of mobile lice on the fish. Where numbers of mobile lice are high, treatments are triggered even in the absence of egg bearing females. Outside of the critical spring period, a level of **2.0** egg bearing lice acts as a trigger for treatments. This is only relaxed where fish are under harvest and with the agreement with the Department of Marine and Natural Resources or its agent.

Over the period since the initiation of SBM, treatment triggers have been progressively reduced from a starting point of 2.0 per fish during the spring period to the current levels which are the optimal sustainable at present. These trigger levels will be kept under review in the light of advances in lice control strategies. Triggered treatments are underpinned by follow up inspections and, where the Department or its agent considers it to be necessary, by sanctions. Sanctions employed include, peer review under the SBM process, conditional fish movement orders and accelerated harvests.

5. Synchronous Sea Lice Treatment and Control in Bays

All fish farms operating in a particular bay will be required to undertake appropriate synchronous sea lice treatment and control strategies through the Single Bay Management/CLAMS process. The Department of Marine and Natural Resources or its agent reserves the right to devise appropriate strategies for synchronous action by fish farms in any bay.

6. Sampling Strategy

The Irish sampling strategy methodology is designed to:

- Provide a robust and reliable objective measure of lice numbers on farmed fish
- Operate within a framework which is cost effective and capable of being carried out over the range of installations which are in use in offshore farming
- Take account of weather conditions, fish health issues, environmental effects and animal welfare considerations.

There are four key components to this sampling strategy: the sampling method, the sampling frequency, the sample size and reporting mechanisms.

6.2 Sampling Method

The full methodology is laid out in ***Appendix 1.*** It is essentially a non-destructive sampling method. Fish are removed at random from the cages and anaesthetised, to reduce stress and risk of injury. All adult and sub-adult mobile lice are then removed from the fish and retained for examination before the fish are allowed to recover and returned to the cage. Lice which become detached from the fish in the anaesthetic are collected and included in the lice count for the sample to ensure that lice numbers are not under reported. As it involves the handling of live animals and as there are animal welfare issues involved, the sampling process is subject to peer review and a licensing process. Strict limits are imposed on the number of fish which may be sampled and changes to these limits must be justified.

6.3 Frequency Sampling

The sampling frequency will fourteen inspections per year, plus any follow-up inspections required where instructions to reduce lice levels have been issued or such other frequency as may be determined by the Department or its agent.

6.4 Sample Size

The target number of fish sampled is sixty per inspection, comprising two samples of thirty fish. One sample is taken from a standard cage, inspected at each inspection, and one from a cage selected at random. Where there are difficulties in obtaining the full sample size, every effort will be made to obtain a minimum of ten fish in each sample. (This sample size is statistically robust and also takes into consideration the practicalities and animal welfare issues involved in carrying out the programme. The standard cage allows for the monitoring of within cage trends and the random cage acts as a spot check).

6.5 Reporting of Lice Monitoring

Monthly reports are compiled for each site of mean numbers of egg bearing lice and total mobile lice of each species. These reports are circulated to the farms, the Department of the Marine and Natural Resources, the Marine Institute, the Central Fisheries Board, the Regional Fisheries Boards, Save Our Sea Trout, the Western Gamefishing Association and the Irish Salmon Growers' Association. This ensures that detailed information on the levels pertaining on farms is available to all interested parties. These reports are designed to give a clear, unambiguous measure of the infestation level at each site and to act as a basis for management decisions.

APPENDIX 1.

Sampling Methodology

This protocol is followed in the carrying out of sea lice inspections on all salmon and rainbow trout farms.

Disinfection

Due to the real risk of transmitting disease from one site to the next the Disinfection Protocol should be rigidly adhered to.

It is especially important to ensure that your hands and protective clothing are kept clean and disinfected by washing with the Iodophor disinfectant provided. Disinfection of dirty clothing or equipment is not possible as the dirt reduces the effectiveness of the disinfectants.

Cages to be sampled

The standard cage (*i.e.* the selected cage which is sampled at each sampling session).

A random cage: To be selected by the inspector on the day. This cage may be nominated at the start of the inspection or on the morning of the inspection so that it can be left un-fed to facilitate the catching of fish. The inspector may, at his/her discretion, consult with the Fisheries Board's observer on the selection of the random cage.

Fish to he sampled

A sample of thirty fish is to be taken from a standard and random cage for each year class of fish on site.

Where there are only two cages of fish on site only one cage need be sampled.

Where fish are on starve for immediate harvest they need not be sampled.

Methods of Sampling

Fish may be caught by any of the following methods:

1. With a hand net (with or without the use of feed to attract fish).
2. By seining the cage.
3. By the use of a brailer.
4. By the use of a box net.
5. By pulling the net and removing fish using a net or brailer.
6. By use of a draw net.
7. By sampling fish being removed for harvesting.

Limitations to sampling

Sampling should not be attempted where weather conditions are such as to put the safety of personnel or the health of the fish at significant risk.

Where there is difficulty in obtaining a full sample of thirty fish every effort should be made to obtain a minimum of ten fish.

Where it is not possible to obtain a representative sample the sampling of damaged or moribund fish only should be avoided, as this will not give a representative measure of lice infestation levels within the cage and will skew the results for the site as a whole.

Difficulties in obtaining samples should be noted.

Registration of lice from fish sampled

All mobile stages of lice should be removed from the fish and placed in a bottle containing alcohol.

Attached stages may be removed, at the discretion of the inspector, for research purposes.

All lice remaining on the sampling tray or in the bin of anaesthetic should be collected and placed in a bottle containing alcohol and labelled “Bin”.

All sample bottles including the “Bin” bottle are to be placed in a plastic bag together with a waterproof label containing the following minimum information:

1. Date

2. Year Class of Fish
3. Site sampled
4. Number of fish sampled
5. Cage number

Inspection Forms

An inspection form should be completed for each inspection. The farm representative, the RFB observer and the inspector should sign the form.

Water Samples

A 30ml water sample should be taken at each inspection and preserved by the addition of 3-4 drops of Lugols Iodine.
This sample should be forwarded to the Phytoplankton section at the FRC at the earliest opportunity.

Disinfection Protocol for Sea Lice Inspections

1. All protective clothing, footwear, containers and equipment to be dipped/washed in iodophor (0.5%) on return to shore.
2. All observer from RFB's to be advised to disinfect before entering and on leaving Dip and/or wash all footwear and protective clothing in iodophor (0.5%) prior to leaving the shore base for the sea site.
3. All bins, containers and equipment to be dipped/washed in iodophor (0.5%) prior to leaving the shore base for the sea site.
4. All instruments and work surfaces to be washed in Virkon (2%) prior to use.
5. All observers from RFB's to be advised to disinfect before entering and on leaving site, as per above protocol.

<u>**APPENDIX 2**</u>

Key Facts about lice infestation during 2007

Dr David Jackson

Atlantic salmon 2005 (two-sea-winter salmon)

At the beginning of 2007, two-sea-winter salmon were still being stocked on 4 sites; Corhounagh (Mannin Bay Salmon Ltd.); Seastream Inner (Clare Island Seafarms Ltd.); Millstone (Marine Harvest); and Lough Swilly (Marine Harvest). Table 1 contains number of inspections per site and total number of inspections exceeding the treatment trigger.

Table 1. National breakdown of inspections for 2005 fish on fish farm sites in 2007.

Company	Site	Samples in Spring	Over in Spring	Samples outside	Over outside	Total Samples	Total Over	% over in Spring	% over outside	% over total
Mannin Bay Salmon Co Ltd	**Corhounagh**	0	0	1	1	1	1	-	100%	100%
Clare Island Seafarms Ltd.	**Seastream Inner**	2	0	2	0	4	0	0%	0%	0%
Southwest	**Totals**	2	0	3	1	5	1	0%	33%	20%
Marine Harvest	**Millstone**	3	3	0	0	3	3	100%	-	100%
	Lough Swilly	0	0	1	1	1	1	-	100%	100%
Northwest	**Totals**	3	3	1	1	4	4	100%	100%	100%
National Totals		5	3	4	2	9	5	60%	50%	56%

A total of 9 visits were undertaken to these sites before harvesting was completed, with 56% of inspections exceeding treatment trigger levels.

Atlantic salmon 2006 (one-sea-winter salmon)

One-sea-winter salmon were stocked in a total of 17 sites in 19 bays in 2007. One hundred and fifty-six visits were undertaken to this generation of fish. Five sites, in 4 bays, continued to stock one-sea-winter salmon in November 2007.

Ovigerous *L. salmonis* levels greater than the treatment trigger level were recorded in a total of 75 inspections (48%) on one-sea-winter fish. Within the critical spring period, sea lice levels were in excess of 0.5 ovigerous females per fish on 50 inspections (60%) and outside of the spring period 25 inspections (35%) were in excess of 2.0 ovigerous female sea lice per fish.

Southwest Region

In the Southwest region, all of the 6 inspections in the spring period (March to May) were in excess of treatment trigger levels and 1 of the 4 inspections outside the spring period exceeded the treatment trigger levels (see Table 2). Roancarraig (Silver King Seafoods Ltd), Bantry Bay, was the only site stocking 2006 fish in 2007.

Table2. Breakdown of inspections for 2006 fish on Southwest sites in 2007.

Company	Site	Samples in Spring	Over in Spring	Samples outside	Over outside	Total Samples	Total Over	% over in Spring	% over outside	% over total
Silver King (Beara Atlantic) Ltd	Roancarraig	6	6	4	1	10	7	100%	25%	70%
Southwest	Totals	6	6	4	1	10	7	100%	25%	70%

West Region

In the West region, sea lice infestation levels greater than the treatment trigger were recorded on 34 out of 51 inspections (67%) in the spring period and on 15 out of 43 inspections (35%) outside the spring period (see Table 3).

Table 3. Breakdown of inspections for 2006 fish on West sites in 2007.

Company	Site	Samples in Spring	Over in Spring	Samples outside	Over outside	Total Samples	Total Over	% over in Spring	% over outside	% over total
Muirachmhainni Teo	Cuigeal	0	0	1	0	1	0	-	0%	0%
	Casheen	5	3	1	0	6	3	60%	0%	50%
	Daonish	6	3	3	0	9	3	50%	0%	33%
Muir Gheal Teo	Cnoc	6	5	3	2	9	7	83%	67%	78%
	Ardmore	6	6	5	4	11	10	100%	80%	91%
Mannin Bay Salmon Co Ltd	Corhounagh	4	4	6	4	10	8	100%	67%	80%
	Hawk's nest	2	2	2	1	4	3	100%	50%	75%
Bifand Ltd	Fraochoilean	6	6	4	2	10	8	100%	50%	80%
Celtic Atlantic Salmon (Killary) Co ltd	Rosroe	6	2	4	0	10	2	33%	0%	20%
Clare Island Seafarms Ltd.	Seastream Inner	4	0	6	1	10	1	0%	17%	10%
	Portlea	6	3	8	1	14	4	50%	13%	29%
West	Totals	51	34	43	15	94	49	67%	35%	52%

Levels at Daonish (Muirachmhainni Teo), Kilkieran Bay, were in excess of treatment trigger levels for 3 out of 6 inspections in the spring period and none of the 3 inspections outside the spring period. At Casheen (Muirachmhainni Teo), Kilkieran Bay there were 5 inspections, 3 of which over treatment trigger levels.

Cnoc (Muir Gheal Teo.), Kilkieran Bay, were above treatment trigger levels for 5 of the 6 spring inspections and 2 of the 3 inspections outside the spring period.

Ardmore, (Eisc Ui Flathartha Teo), Kilkieran Bay, were above treatment trigger levels for all of the 6 spring inspections and 4 of the 5 inspections outside the spring period.

At Corhounagh (Mannin Bay Salmon Co. Ltd.), Mannin Bay, sea lice exceeded treatment trigger levels for all 4 inspections in the spring and for 4 of the 6 inspections outside the spring. Both inspections at Hawk's Nest in the spring were in excess of treatment trigger levels and for 1 of the 2 inspections outside spring.

Fraochoilean (Bifand Ltd.), Ballinakill Bay, exceeded treatment trigger levels for all 6 spring inspections and 2 of the 4 inspections outside the spring period.

Sea lice levels at Portlea (Clare Island Seafarms Ltd), Clew Bay, were in excess of treatment trigger levels for 3 of the 6 inspections in spring and 1 of the 8 inspections outside the spring period.

Northwest Region

The treatment trigger levels were exceeded on 10 out of 27 inspections (37%) in the Northwest region during the spring period and on 9 out of 25 inspections (36%) outside that period (see Table 4).

Table 4. Breakdown of inspections for 2006 fish on Northwest sites in 2007.

Company	Site	Samples in Spring	Over in Spring	Samples outside	Over outside	Total Samples	Total Over	% over in Spring	% over outside	% over total
Marine Harvest	**Millford**	3	1	2	0	5	1	33%	0%	20%
	Cranford A	6	3	2	2	8	5	50%	100%	63%
	Millstone	6	3	8	3	14	6	50%	38%	43%
	Glinsk	6	3	7	1	13	4	50%	14%	31%
	Lough Swilly	6	0	6	3	12	3	0%	50%	25%
Northwest	**Totals**	27	10	25	9	52	19	37%	36%	37%

Cranford A (Marine Harvest), Mulroy Bay, had sea lice levels in excess of treatment trigger levels in December/January, February, March, and April. The fish were harvested out in July. Millstone (Marine Harvest), Mulroy Bay, had elevated sea lice levels for December/January, March, May, June, September and November. Glinsk had elevated sea lice levels for 3 inspections in the spring period and again in October prior to harvesting.

Regional Monthly Means for one-sea-winter salmon

L. salmonis monthly mean figures for one-sea-winter salmon are shown in Figures 1 and 2 for each of the three regions. Regional monthly mean *L. salmonis* levels were in excess of treatment trigger levels in all 3 regions during the spring months in 2007 with the exception of the Northwest in April. The Southwest exceeded treatment trigger levels again in July prior to harvest. In the West monthly mean ovigerous levels were in excess of treatment trigger levels outside of the spring period in February, July, August, September and November. In the Northwest monthly mean ovigerous levels exceeded the treatment trigger levels in February and again from August to November inclusive outside of the spring period.

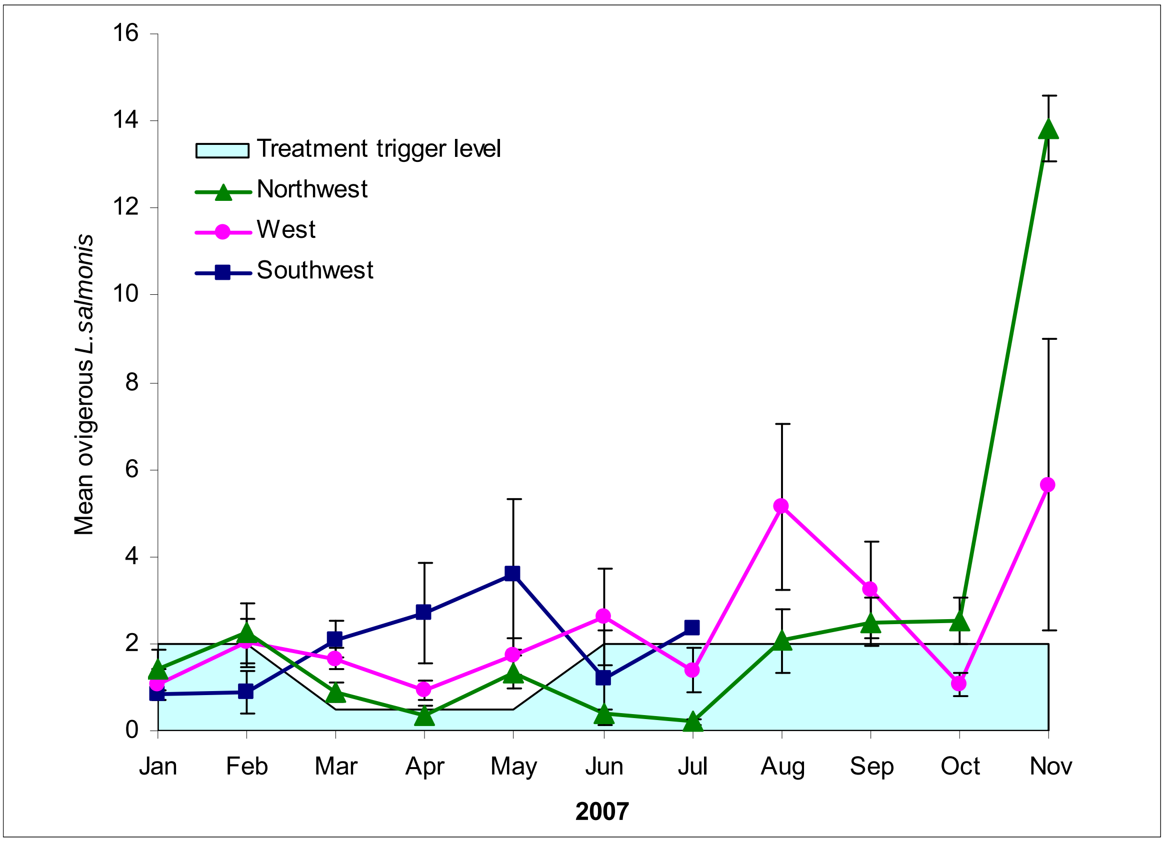

Figure 1. Mean (SE) ovigerous *L. salmonis* per month per region in 2007.

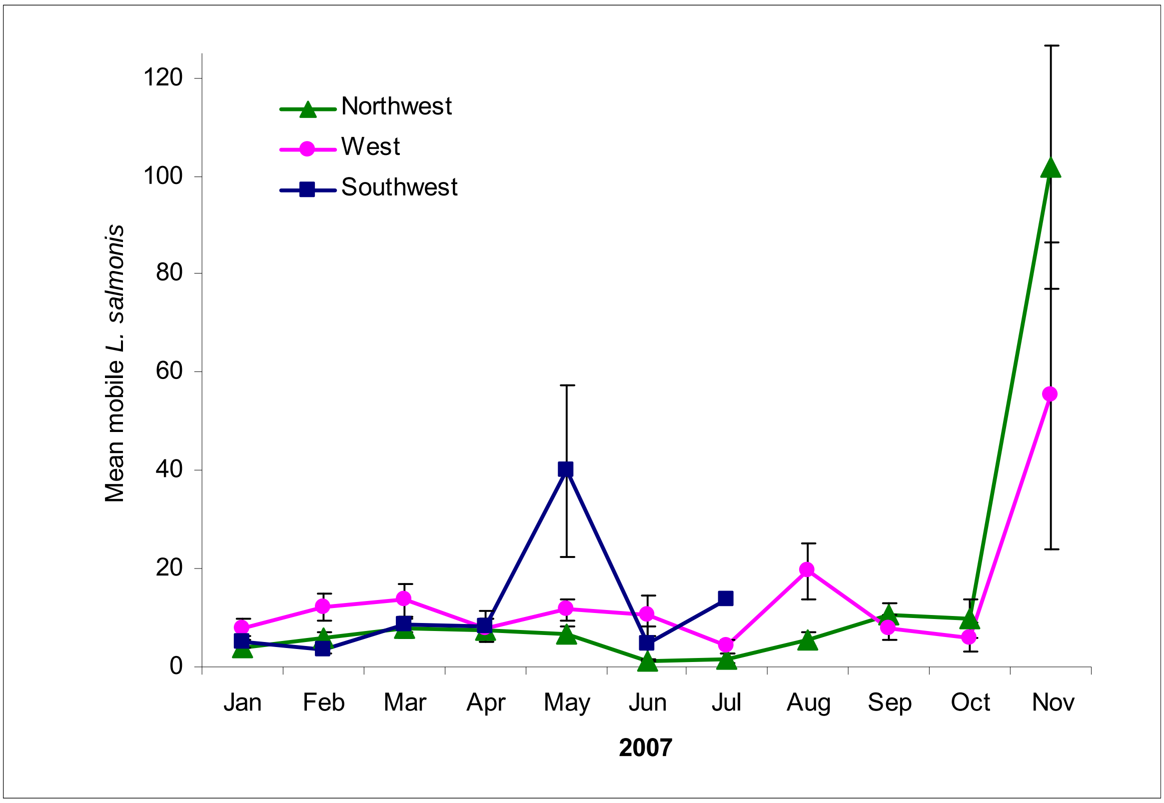

Figure 2. Mean (SE) mobile *L. salmonis* per month per region in 2007.

Total mobile sea lice levels exceeded 10 sea lice per fish in February, March, May, June, August and November in the West region. In the Northwest total mobile levels exceeded 10 per fish in September and November and in the Southwest in May and July.

Annual trends

L. salmonis ovigerous and mobile level trends are compared in Figures 3 and 4 for one-sea-winter salmon in the month of May from 1991 to 2007. The mean number of ovigerous sea lice per fish, and the mean number of mobile sea lice per fish are presented.

Sea lice levels were at their lowest on record in 2001 for both ovigerous and total mobile lice. Mean ovigerous *L. salmonis* levels have increased steadily since, with the exception of 2004. Levels in 2007 are at 1.74 ovigerous per fish, the highest since 1992 which reached 2.34 ovigerous per fish.

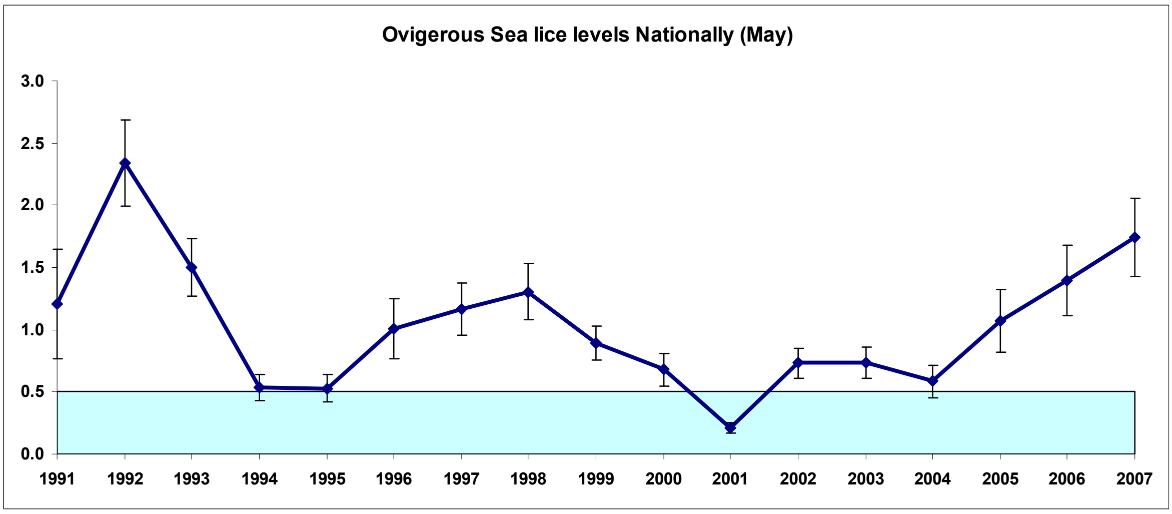

Figure 3. Annual trend (May mean) (SE) ovigerous *L. salmonis* on one-sea-winter salmon.

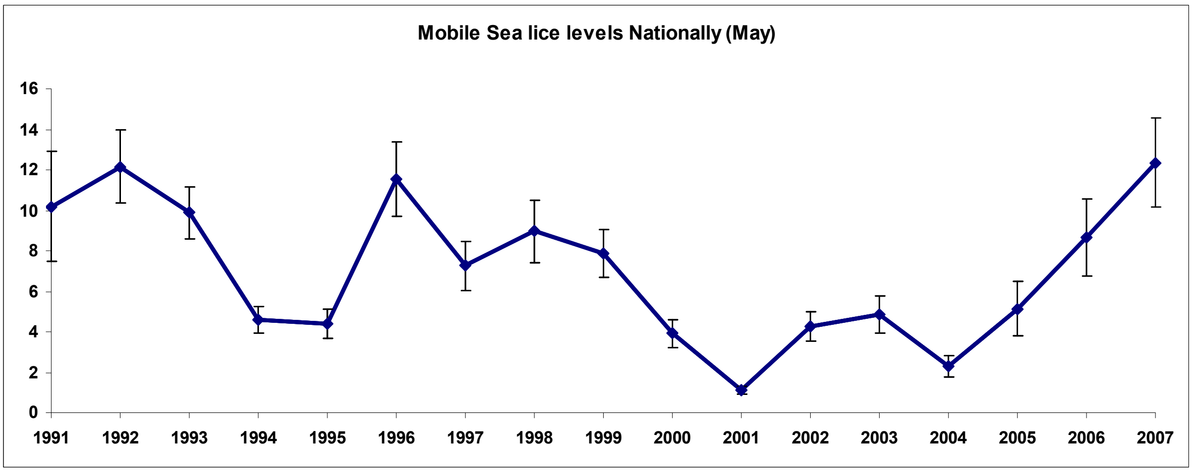

Figure 4. Annual trend (May mean) (SE) mobile *L. salmonis* on one-sea-winter salmon.

Mean mobile levels show a similar pattern with a steady increase from 2004 to their highest level on record in 2007 at 12.35 mobile sea lice per fish.

Optimally using all available sites in an area to keep generations of fish separate is a key tool in breaking the life cycle of the sea lice and keeping infestations under control so as to avoid cross infection of younger fish from older stocks. Having sufficient and appropriate sites available to cater for separation of generations and fallowing is important and this has been raised as an issue by the industry frequently. Fallowing also serves to break the life cycle of the sea lice, as can be seen in Lough Swilly (Marine Harvest) this year where the site was fallow early in the spring, control of sea lice was achieved until the autumn. However in certain cases re-infestation from the surrounding environment has occurred quite quickly.

Appendix 3

Sea Lice Data for March 2008

	Date	*Lepeophtheirus salmonis* F + eggs	Total
BANTRY BAY			
FASTNET MUSSELS LTD			
Cuan Baoi			
Atlantic salmon, 2008 S 1/2	04/03/2008	0.00	0.07
	18/03/2008	0.03	0.13
SILVER KING SEAFOODS LTD			
Roancarraig			
Atlantic salmon, 2008 S 1/2	04/03/2008	0.00	0.04
	19/03/2008	0.00	0.00
JOHN POWER TROUT			
Waterfall			
Rainbow trout 2007 (1)	04/03/2008	0.00	0.00
	19/03/2008	0.00	0.03
KILKIERAN BAY			
MUIRACHMHAINNI TEO			
Daonish			
Atlantic salmon, 2007 S 1/2	06/03/2008	0.35	3.67
	19/03/2008	0.63	10.08
Golam			
Atlantic salmon, 2008 S 1/2	05/03/2008	0.14	1.76
	20/03/2008	0.12	1.67
MUIR GHEAL TEO			
Cnoc			
Atlantic salmon, 2007 S 1/2	13/03/2008	1.49	8.09
	27/03/2007	0.94	23.33
Ardmore			
Atlantic salmon, 2007 S 1/2	13/03/2008	1.00	10.64

	27/03/2008	0.91	13.00

Lettercallow

Atlantic salmon, 2008 S 1/2	13/03/2008	0.02	0.12
	27/03/2008	0.00	0.55

The Gurrig

Atlantic salmon, 2008 S 1/2	05/03/2008	0.20	2.83
	20/03/2008	0.25	3.30

MANNIN BAY

MANNIN BAY SALMON CO LTD

Hawk's Nest

Atlantic salmon, 2007	Moved to Corhounagh		

Corhounagh

Atlantic salmon, 2007	18/03/2008	0.82	28.09
	27/03/2008	0.84	29.90

BALLINAKILL BAY

BIFAND LTD

Fraochoilean

Atlantic salmon, 2007 S 1/2	04/03/2008	3.40	8.73
	25/03/2008	2.48	9.63
Atlantic salmon, 2008 S 1/2	04/03/2008	0.00	0.35
	25/03/2008	0.00	0.68

MANNIN BAY SALMON CO LTD

Ballinakill

Atlantic salmon, 2006	04/03/2008	4.78	11.89
	25/03/2008	7.88	40.38

KILLARY HARBOUR

CELTIC ATLANTIC SALMON (KILLARY) LTD

Rosroe

Atlantic salmon, 2007	14/03/2008	0.39	1.75
Atlantic salmon, 2007	28/03/2008	0.14	0.78

CLEW BAY

CLARE ISLAND SEAFARMS LTD

Seastream Inner

Atlantic salmon, 2006	06/03/2008	0.23	2.22
	20/03/2008	0.35	3.04

Portlea

Atlantic salmon, 2007	06/03/2008	2.31	6.57
	25/03/2008	0.49	1.50

BEALACRAGHER BAY

CURRAUN FISHERIES LTD

Curraun

Rainbow trout 2007 (2)	06/03/2008	0.06	0.35
	20/03/2008	0.04	0.36
Rainbow trout 2007 (3)	06/03/2008	0.04	0.41
	20/03/2008	0.00	0.07

DONEGAL BAY

EANY FISH PRODUCTS LTD

Inver Bay

Rainbow trout 2007 (2)	14/03/2008	0.00	0.13
	27/03/2008	0.00	0.21
Rainbow trout 2007 (3)	14/03/2008	0.00	0.16
	27/03/2008	0.05	0.80

MARINE HARVEST

McSwyne's Bay

Atlantic salmon, 2007	14/03/2008	0.05	2.77
	27/03/2008	0.75	3.06

Ocean Inver

Atlantic salmon, 2008 S1/2	14/03/2008	0.00	0.04
	27/03/2008	0.00	0.03

MULROY BAY

MARINE HARVEST

Moross I

	Atlantic salmon, 2007	04/03/2008	0.14	5.05
		19/03/2008	0.25	7.70

Millstone

	Atlantic salmon, 2006		Harvested Out	
	Atlantic salmon, 2007 S 1/2	04/03/2008	0.00	4.48
		19/03/2008	0.05	3.09

LOUGH SWILLY

MARINE HARVEST

Lough Swilly

	Atlantic salmon, 2006		Harvested Out	
	Atlantic salmon, 2007 S 1/2	04/03/2008	0.25	10.77
		19/03/2008	1.09	13.45

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: A. Johansen
*Organization/Company: P/F Bakkafrost
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2	2.1 General	General remarks regarding the AZE. In the Faroe Island, we do not operate with an AZE as it is specifically defined here in the standard, and hope to get the opportunity to see a more broad definition of the AZE . In the FO, The farming is carried out in fixed farm sites. The farm site licenses restrict the farming to a designated farming area, within which the farmer is allowed to move freely. The possibility to move the farm units inside the farm site, either between generations or more often, gives the area the oppurtunity to lie fallow on certain areas, beyond the genereal fallow period between stocking, and hence rest and recreate in even up to several years. The Faroese system and limit values are based on similar systems that are used in the monitoring of farming in Norway and	We suggest the standard should allow for a broader definition of an AZE and national legislative monitoring systems to find suitable solutions for site specific conditions.

		Scotland.	
	2.1.2	The draft allows for choosing between different faunal indexes. Consideration should be taken to the natural type of seabed when assessing the faunal score. Taxonomic analysis: The standard demands an increase in amount of samples and double samples for taxonomic analysis compared to the situation today, and hence, as these taxonomic analyses are expencive, a great increase in monitoring costs.	Suggest that consideration shall be taken to the natural type of seabed when assessing the faunal score. To allow for comparison with the natural reference site. Suggest to decrease the number of samples for taxonomy.
	2.1.3	See 2.1.2	
	2.1.4	Please see our general remarks on the definition of an AZE.	
Principle 2	2.5.1	Acoustic devices are used to prevent seals from going into nets at salmon farms. The standard points to "other, potentially less impactful and more effective deterrence practices" and lists promptly removing dead fish, reducing stocking densities, net tensioning and use of seal blinds. In our company we already use these preventive measures in order to protect our farmed animal stock from possible attacks of wild animals and in order to prevent unnecessary wild life destruction actions. But we still see seals in and around our salmon farms. Seal blinds will only help in those cases where the seals are eating on the dead fish through the nets or going through the nets at certain points. At the farms the seals are going through the nets at different places.	We see that acoustic devices may not be perfect in reducing depredation but we think it is unwise to forbid acoustic devices at salmon farms before there is something else which will have the same results.

Principle 3	3.1.4	Testing for sea lice is not an exact science. The numbers can vary a lot from one testing to the next testing. Putting forward numbers for each farm weekly does not give useful information about the condition out at the farm and in the area. Numbers for one farm can be used as "the truth" and the big picture can be forgotten.	We think the numbers should be put together for areas and those numbers should be made public once a month. This will tell something about the development in an area. It could be taken in to consideration, based upon the general lice count status and temperature differences, to allow for counting every 14 day in specific regions and different time of year.
Principle 4			
Principle 5	5.2.5	Today different countries and areas have different regimes for treating salmon against sea lice. These regimes are based on experience with the farmed fish and the environment around the farm. Different environment means that there has been, and are, varying problems with lice and hence different solutions to the problem. The Faroe Islands has had small problems with lice in recent years. When the lice numbers have been too high according to legislative demands the solution has been to treat with chemicals. Because we haven't had lice problems for several years, since the new legislation and after the ISA outbreaks primo 2000, little attention has been given to finding other alternative solutions in combating lice, such as biological combating. Wrasse is not native to the Faroe Islands and wrasse or other cleanerfish has not been used in the islands. Today there is some research done to try to find native species which can be used for sea lice control. Because there are no biological means of controlling sea lice we	We suggest a PTI of 9 as a start and then there could be a demand for reducing PTI over a time frame of 5 years.

		still need to use chemical treatment to control sea lice until there can be established a different way of controlling sea lice. Hence, a PTI of less than 6,8 means that it will not be possible to treat large fish more than once. As the situation is, we could not comply.	
Principle 6			
Principle 7			
General comments			

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3			
Principle 4			
Principle 5			
Principle 6			
Principle 7			
General comments			

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Myron Roth
*Organization/Company: British Columbia Ministry of Agriculture
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Genera Comments	1	Collection of information for standards that are not defined; fate and use of collected information. In several instances, the "standard" is a request for information (e.g.: 2.2.3, 3.1.2, 3.1.8, 4.6.1. – 4.6.3). In some instances the information is meant for compilation in the ASC database and/or for research purposes. There are two issues with this approach that require further consideration. First, the standards should not be used to generate information to frame or define a new standard. This approach is not objective nor is it science-based. Second, there is a concern over the fate and use of information submitted to a third party data base (the ASC data base).	Where there is insufficient information to frame or define a standard, the SC should consult with the appropriate Technical Working Group or the research community so the issue can be properly addressed. Before the standards require submission of data to such an entity, the administrative structure overseeing the entity must be clearly established.

	2	Animal Welfare. We reiterate that animal welfare should be included as a term of reference and a standard. Given the standards deal explicitly with fish health issues this implies, rather directly, the SC through has sufficient expertise. They can also rely on expertise from the appropriate Technical Working Group.	Revise standard to consider animal welfare as a term of reference.
	3.	Unit of Certification It is still unclear how a corporate entity will benefit from the standards where the unit of certification is the individual farm. In most instances, companies brand their fish using a corporate or regional identity where fish is supplied from several farms. If in a region, one farm is not compliant with the standards or loses certification, how does this affect the any corporate claim of compliance to the standard?	Review how the standards would allow corporations to identify compliance with the standards.
	4	Standards not in force. There is a general concern over the number of standards that are included where there is a little information available; required certification schemes (such ISEAL) are required, but not in place; and/or are being used as “place holders”. Such requirements are vague and overly dependent on third party actions that are out of the control of both the SAD Salmon Standards and the salmon farmers seeking certification.	Consider removing such standards until sufficient information is available to include them with clearly established frameworks and values.
Principle 1	General Comment	While compliance with local laws is to be expected and can be measured, it’s difficult	Consider auditing non-compliance rather than compliance based on a legal review to identify

		to see how this fits with the idea of a "global" standard to mitigate "…key negative environmental and social impacts of salmon farming…" given the different requirements from region to region. Some regions have a greater number of regulatory requirements, some of which may be more or less stringent, than other jurisdictions resulting in an uneven playing field. Auditing compliance with all applicable laws will be very onerous and cumbersome from an auditor/program perspective. This is because the general terms of reference for what could be a very large and disparate set of requirements will be different from country to country, region to region. Compliance with all applicable country laws may be difficult to interpret in some situations. How will the standard be interpreted if a legal requirement is so broad in scope, as is often the case with legislative text, which may be subject to a range of interpretations? Further, what happens if an auditor assessment of a regulatory requirement differs from the region's regulatory officials? The notion of a "final standards document" that would be required as an audition guidance reference document will be prohibitively expensive if it is to be used for all regions and updated to keep pace with changes in regulations and policies.	violations (charges/non-compliance/warning letters issued by the regions regulatory officials) to reduce ambiguity interpreting where or not a regulatory requirement has been complied with. Where cases (either public or private) are brought against a farmer who was not found guilty of the charge or acquitted through a legal proceeding, they would be in compliance with the standard.

		Having auditors review compliance will all applicable laws is an unnecessary duplication of effort that will simply increase producer's cost with no net benefit. It is suggested the standard ensures the laws are in place and that they are enforced through the regulatory inspection and compliance process. The standard notes a review of violations and associated corrective actions is required. This does not take into account nuisance law suits where commonly accepted business/agricultural practices are employed.	
	1.1.5	Not sure why this standard is in this section.	Move to Principle 5.
Principle 2	2.1.1 – 2.1.3	Re: Hard benthos. There is a initial standard associated with Fisheries & Oceans (Canada) salmon farm authorizations in British Columbia that focuses on % coverage of *Beggiatoa* and opportunistic polychaete complexes a set distances from site boundaries.	
	2.1.2-2.1.3	Data is complex and difficult to assess. There are better proxy measures to assess environmental impact to sediments.	
	2.2.1-2.2.2	Is there a scientific justification for routine DO monitoring? While DO is directly related to performance, DO levels tend to fluctuate quite widely in direct response to environmental conditions. More importantly, a farm's contribution to DO fluctuations in the water column is negligible compared to environmental influence. DO may crash temporarily (e.g.	Review and revise requirements so they are more practical.

		algal bloom) but can recover just as quickly. While DO monitoring can provide useful information on a day to day basis, it says little about trends with respect to environmental degradation (hence the trend to sediment monitoring – which is a much more valuable indicator of environmental degradation). Transient fluctuations in DO could mathematically drop the weekly DO average and have nothing to do with the farm.	
	2.2.3	Not sure why this standard is included. As noted in the general comments, the standards should be used to assess what should and shouldn't be a standard.	Remove this requirement, or make it recommendation at the discretion of the applicant ensuring that it is not included in the certification criteria.
	2.3.1	New standard/requirement for BC.	We would suggest that this could be regulated through labeling requirements/ manufacturing specifications or confirmatory testing by the manufacturer "*prior to delivery*" (as allowed in Appendix 1, Section 2). Providing options makes the standard more accessible.
	2.4.1	To be practically effective, "critical, sensitive or protected habitats" needs to be defined. Similar standards are in place in BC so it would be unreasonable to expect farmers to accommodate two standards, given the cost of environmental assessment studies, if they are somewhat different.	Suggest giving more detail in the appendix on what criteria will be used, on a region by region basis to qualify "critical, sensitive, or protected habitats and species."
	2.5.3	Vague requirement.	As noted above, the standard should be more specific where possible. If a standard references a "national species list" (as mentioned in the footnote), the list or specific legislation should be cited.
	2.5.3 – 2.5.4	How do standards 2.5.3 and 2.5.4 related to one another? Are they mutually exclusive?	Provide clarity between the two standards.

		If so, this should noted in the explanatory text.	
	2.5.4	In some instances, regulatory authority may not be required, thus clarification might be required for some regions. Further there may be justification to euthanize an animal for humanitarian/animal welfare reasons.	Review and revise standard.
	2.5.7	The definition of a lethal incident is too broad. What is meant by "accidental"? If any non-salmonid mortality must be reported this would be impractical and does not appear to be science-based.	Suggest focuses on the key species or species groups of interest from a science-based assessment of those that are at risk.
Principle 3	3.1.5	Re: Wild salmon data. What is the scientific justification for the 50 km limit? A value of 75 km is used in the explanatory text, but 50 km is used in the standard. For some regions this will incorporate a very large number of salmon producing waterways and data may not be readily available for all of them. Therefore, how is the standard to be applied in a meaningful way given that migration routes are not always clear to fisheries biologists. As written the standard is too vague and is entirely dependent auditing guidance making it difficult to comment.	Review and revise the standard.
	3.1.7	The relative risk to wild salmon populations from farm salmon lice are not the same between regions such as BC and Norway, which is referenced as the justification for Option A. In BC, Option B would be the more suitable alternative provided that a level can be established through a science-based/peer review process.	Suggest provided Option A *OR* Option B, where regionally based wild salmon lice standards/limits have been determined.
	3.1.8	Undeveloped ASC Template format for	

		"other data points". As noted above, collecting research data through a Standards scheme is not science-based. To be included in the standard the data-points should be clearly defined. There is also a concern over the fate and use of the information collected by the ASC in the absence of an administrative framework.	
	3.2-Additional Information	Re: Definition of "widely commercially produced in the area".	Suggest removing the word "widely".
	3.3	Re: Definition of transgenic. The definition of transgenic needs to be clarified. Insertion of genes alone is too vague. The definition has to clarify, more specifically, that the inserted genes are incorporated into the host genome. More specifically, the definition should not preclude the use of recombinant DNA technology used in fish medicines or vaccines.	Revise Definition for transgenic – or explicitly exclude medicines and vaccines derived from recombinant technology.
Principle 4	General Comment	From a farm-level site certification perspective, the indicators and standards for feeds and raw materials are not practical. This is largely because farmers cannot be expected to have access to materials records from their feed suppliers, which are largely proprietary formulations and therefore confidential business information.	Provide an option for farmers to compile this information or produce documentation that feed was supplied from a feed manufacturer who is certified to the standard. This would require a separate set of Feed Standards. This would provide a more practical way of tracking feed materials and use of wild fish and fish oil for feed while at the same time protecting confidential proprietary business information.
	4.2.1.	As noted above, this will be difficult for farmers to calculate without access to raw materials records from feed suppliers. As noted in 4.2.1 – these standards (if adopted) should be a requirement of feed	Review and revise standard.

		suppliers not farmers – unless a salmon farmer produces their own feed.	
	4.2.3	Protein Retention Efficiency (PRE). Where standards such as the PRE are "relatively undocumented in the field" they should not form the basis for a standard.	Remove as a standard *per se*, consider inclusion in the standards as an option.
	4.6.1-4.6.3	Life Cycle Assessment Standards. Calculation of GHG emission and energy life-cycle analysis is complex and requires a high degree of expert knowledge that is most likely out of the scope of most farmers. This will be particularly true for GHG equivalence estimates for feed and building materials sourced from third parties. While we agree with the use of Life Cycle Assessment to evaluate the energy consumption/greenhouse gas assessment – this will only produce meaningful results if done by third-party contractors and experts. In particular, the standards need to validate a common protocol that generates comparable GHG emission equivalence estimate values – which can then be used to establish standards. Until this can be done, requiring farms to generate GHG and energy assessment is premature.	Remove and consider the development of more detail protocols to established specific GHG/energy consumption standards.
Principle 5	General Comment	Sea lice action levels. There is a global trend to reduce sea lice action levels lower and lower. This in term will promote increased use of chemotherapeutants. Consider the guiding principle on page 23: "There is a trade-off between pressing for very low sea lice levels and the danger of over-treatment and the development of	Review and revise standards, and in particular treatment triggers, so that they do not inadvertently contribute to the development of resistance.

		resistance”. The possibility of promoting resistance should be a weighted factor when considering sea lice control options/standards. That is, it would be a primary consideration with respect to lice management and use of chemotherapeutants due to the recent development of resistance to emamectin benzoate, the treatment compound of choice for sea lice management. This is a critical consideration because there are no new sea lice treatment compounds in the development/commercialization pipeline. It is therefore paramount to protect sea lice treatment compounds from the development of resistance through well thought out, regionally relevant, integrated pest management strategies that incorporate resistance avoidance/management practices.	
	5.1.4	The wording of the requirement is not consistent with the explanation given in the text (Footnote 67). The requirement notes “mortalities” whereas the footnotes specifies “…100% of mortality events…”. These are not the same.	Change “mortalities” to “mortality events” in the standard.
	5.2.1	How is proof of proper dosing defined? Is this based on efficacy, pharmacology data, residue analysis of flesh and/or residue analysis of feed? While it is possible for the attending veterinary to cross check their figures and instructions for medicating fish – it does not provide proof. It would not be economically feasible to carry out residue analysis for all therapeutant treatments administered to the fish.	Suggest removing or rewording this clause in the standard.

	5.2.6	This indicator is not consistent with other tenants of chemotherapy promoted in the standards. For example, sea lice treatments administered prior to smolt migration as a prophylactic measure is an accepted practice. In BC, diseases such as BKD or mouthrot are often very effectively managed prophylactically. Thus, special and/or certain circumstances may justify use of chemotherapeutants prophylactically provided they are used under the direction of a veterinarian.	Review and revise standard to be more consistent with 5.2.3 and which advocates prudent use practices as developed by the veterinary profession.
	5.2.8	We don't accept this standard. It is generally recognized by fish health professionals that the number of approved veterinary medicines has been a constraint for the aquaculture industry. Oxytetracycline is a critically important fish health management tool that if removed from use by veterinarians would put countries like Canada a competitive disadvantage. Access to fewer licensed fish health products would also result in increases in fish health and welfare issues. Further, reducing the number of approved fish chemotherapeutants would put extreme pressure on the use of an even more limited number of drugs effectively promoting the development of resistance.	Review and consider the standard to advocate veterinary oversight, as is done with 5.2.3, risk assessment as is done with 5.2.7 and that advocated prudent use practices as noted above.
	5.4.1	This indicator needs an exception for broodstock sites, which by their very nature are multi-year class sites.	
Principle 6	6.7.2	How is "social compliance" defined?	Define social compliance.
Principle 7	7.1.1-7.1.2	Re Meaningful engagement. The standard	

		needs to account for situation where community representations/stakeholders are not willing or interested in participating in engagement.	
General comments			

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
Principle 1	8.1	Re Compliance with local and national regulations. As noted above, compliance with all requirements can be difficult to interpret within special jurisdictional boundaries. In some instances, especially were recirculation systems are employed and discharged waste water is both concentrated and direct to ground, regulations may be deficient to keep pace with technology.	
Principle 2			
Principle 3			
Principle 4	8.9-8.10	Re Energy use: see comments for section 4.6.1 to 4.6.3	

Principle 5	8.16-8.17	RE WHO designated antibiotics: see comments for section 5.2.8.	
Principle 6			
Principle 7	8.20-8.21	Re Engagement: see comments for section 7.1.1-7.1.2.	
Additional Requirements		How is smolt defined under the standards? Given that the standards apply to the genus *Salmo* and *Oncorhynchus* (page 7) standards 8.24 and 8.25 could effectively eliminate a significant farmed trout sector in Canada. We therefore do not support these standards.	Remove or review and revise standards.

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 1: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14 2011.

*Name: Lise Bergan
*Organization/Company: Cermaq ASA
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

GENERAL COMMENTS

The draft standard has been much improved since the previous version. Still, we believe this standard is far from being widely adopted by the industry and major markets, and the standard is aiming towards a niche-market for selective consumers paying premium prices.

Standard for a niche market
The main reason we believe this standard will not be widely adopted is that the certification process will represent a too burdensome workload for each site annually that is not aligned with and does not build upon existing international standards routinely applied by salmon farming companies such as ISO, OHSAS etc.

The annual certification of a production process that takes more than one year leaves the question of what is to be required for a salmon to become ASC-labeled.
If a site should not be certified until the smolt is supplied from a supplier fulfilling the requirement, the smolt supplier has to qualify 1 year before the smolt is supplied. Then the grow-out phase starts and the site needs to pass one to two more certifications before the salmon is harvested. The risk of failing on one indicator through three inspection processes may be too large for a company to go through this time consuming process.

The draft standard has between 115 and 120 indicators for grow-out only, and as we understand, all standards must be attained.
The actual certification process is not described in full detail. However, we believe that if the certification shall be recognized and accepted as a going standard, we need to improve on the indicator fulfillment ambition level as well as the certification process itself. Based on our knowledge about other environmental standards and certification processes, we have a few suggestions.

1. The objective is to determine whether the production at a site is sustainable (responsible) or not. We believe that if a site fails on one or some of the indicators, which even might be out of the sites control, it is still a sustainable site. We therefore suggest that for each principle, the standard should divide the indicators into "shall" (means that the indicator must be fulfilled) and "should" (which means that the site can be certified without fulfilling the indicator ambition). Then it is possible to say that the site must fulfill 100% of the major indicators and at least 90% of the minor indicators. This is a widely used way of certifying companies, especially when the targets are

detailed and specific. A more flexible system with tolerances for minor deviations would probably make the standard more applicable to the industry today and in the future.

2. It is also common to allow a company some time to fulfill the indicator criteria that have not been met at certification. We therefore suggest that the company is allowed another 6 weeks after certification to close any gaps or open issues. If the site manages to close the gaps, and thereby fulfill all the certification principles, the site will then be certified. This procedure contributes to what we want – contribute to sustainable aquaculture.

3. Recertification ahs to be defined. What is the process and timelines for a recertification of a site if the site fails an audit?.

COMMENTS ON STANDARDS FOR GROW-OUT

PRINCIPLE	INDICATOR	STANDARD	COMMENT BY CERMAQ	PROPOSAL
1	1.1.1, 1.1.2, 1.1.3, and 1.1.4	Yes	Auditing guidelines should provide some flexibility related to e.g. minor deviations and gaps already corrected	Include flexibility in the auditing guidelines.
3	3.1.7 In areas of wild salmonids, maximum on-farm lice levels during sensitive periods for wild fish	Option A: 0.1 mature female lice per farmed fish Option B: 0.1 mature female lice per farmed fish if monitoring reveals lice levels in wild populations has exceed the thresholds described in Appendix III, subsection 2.	The purpose of this indicator is to avoid sea lice negatively affecting wild salmon, and thus the trigger level must be based on how the sea lice levels in farmed salmon effects sea lice levels in wild populations, as suggested in Option B.	Option B
3	3.4.2 Maximum number of escapes in the most recent production cycle	300	Superfluous as indicator 3.4.1.defines the maximum number of an escape episodes as 200 fish with a standard of 0 escapes episodes	Delete indicator.

PRINCIPLE	INDICATOR	STANDARD	COMMENT BY CERMAQ	PROPOSAL
4	4.2.3 Protein Retention Efficiency (PRE) for grow-out	≥35%	It's not clear to us why this 'relatively undocumented' (p.33) indicator has been introduced in place of the previous FPI? We have previously commented that the standard should include documented indicators that measure the efficiency of salmon farming in its use of marine nutrients and we have even gone so far as to design and publish these indicators. The standard should include documented indicators for measuring efficiency in the use of marine nutrients. For details, see scientific documentation: Crampton et al (2010) Demonstration of salmon farming as a net producer of fish protein and oil. Aquaculture Nutrition	This indicator is superfluous as the content is already covered by other indicators in this standard - monitoring of effluents, and - requiring weekly measurement of nitrogen in water The indicator should be deleted.
4	4.3.1 Timeframe for all fishmeal and fish oil used in feed to come from fisheries certified under a scheme that is ISEAL accredited and has guidelines that specifically promote responsible environmental management of small pelagic fisheries	<5 years after the date of publication of the SAD standards	ICES is the key tool for assessment of stocks used for fish meal and fish oil.	Fisheries based on ICES recommendations should be acceptable.

PRINCIPLE	INDICATOR	STANDARD	COMMENT BY CERMAQ	PROPOSAL
4	4.3.2 Prior to achieving 4.3.1, the FishSource score for the fishery(ies) from which all marine raw material in feed is derived. (See Appendix IV, subsection 4 for explanation of FishSource scoring)	All individual scores ≥ 6, and biomass score ≥ 8.	FishSource scoring is problematic due to the time lag between actual status of the fishery and the scores and status on the Fisheries Sustainable Partnership website. This indicator does not add value, and should not be included.	Remove 4.3.2
4	4.3.4 Feed containing fishmeal and/or fish oil originating from by-products or trimmings from IUU catch or from fish species which are categorized as vulnerable, endangered or critically endangered, according to the IUCN Red List of Threatened Species50	None	The definition of vulnerable is not clear. The must be a note describing the term "Vulnerable", and the understanding should be based on IFFO-RS, however that would make the indicator more complicated.	Delete the word "vulnerable"
4	4.4.1 Presence and evidence of a responsible sourcing policy for the feed manufacturer for feed ingredients which comply with recognized crop moratoriums and local laws	Yes	This point appears unclear related to moratoriums.	The word ”recognized” should be replaced with the word ”official”.

PRINCIPLE	INDICATOR	STANDARD	COMMENT BY CERMAQ	PROPOSAL
4	4.4.2 Percentage of soya or soya derived ingredients in the feed that are certified by the Roundtable for Responsible Soy (RTRS) or equivalent	100%, within 5 years of the publication of the SAD standards	This indicator might be problematic for operations not using GM-soy as some companies do not want to participate in RTRS as it is seen as an organization promoting GM soy.	Delete 4.4.2
4	4.6.3 Documentation of GHG emissions of the feed used during the previous production cycle (See Appendix V subsection 2 for guidance and requirement components of the assessment)	Yes, within 3 years of the publication of the SAD standards	If this will be used to compare different feed/feed producer the annex has to specify actual details, e.g. accounting method specified (economic or mass allocation) It is positive with a deadline of three years, but it must be a harmonization between the feed companies otherwise any data comparison could potentially be misleading. Also, is it just seawater cycle or freshwater feeds. Requires commitment from the feed companies on this indicator. Alternatively taken out of the standard for salmon.	Harmonize with other standards from aquaculture dialogues, regarding timing and requirements for documentation. Should be fully aligned with reporting to CDP.
5	5.2.2. Allowance for use of therapeutic treatments that include antibiotics or chemicals that are banned in any of the primary salmon producing or importing countries	None	The relation to approved treatment in importing countries does not have any justification. Neither is there justification for limiting treatment to what is allowed in any of the production countries listed.	Delete indicator

PRINCIPLE	INDICATOR	STANDARD	COMMENT BY CERMAQ	PROPOSAL
7	7.2.2 Evidence that the farm has undertaken proactive consultation with indigenous communities	Yes	This has to be limited to where indigenous people have legal rights for such consultations, based on proximity to the location, tradition or formally recognized title and rights.	Change text to: Evidence that the farm has undertaken proactive consultations with indigenous communities which have officially recognized rights in the area where the site is located
7	7.2.3 Evidence of a protocol agreement, or an active process to establish a protocol agreement, with indigenous people	Yes	This has to be limited to where indigenous people have legal rights for such consultations, based on proximity to the location, tradition or formally recognized title and rights.	Change text to: Evidence of a protocol agreement, or an active process to establish a protocol agreement, with indigenous people who have officially recognized rights in the area where the site is located

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION (SECTION 8 of document)

PRINCIPLE	INDICATOR	STANDARD	COMMENT BY CERMAQ	PROPOSAL
8	8.15 Allowance for use of therapeutic treatments that include antibiotics or chemicals that are banned in any of the primary salmon producing or importing country.	None	The relation to approved treatment in importing countries does not have any justification. Neither is there justification for limiting treatment to what is allowed in any of the production countries listed.	Delete indicator

COMMENTS ON APPENDIXES

APPENDIX	SECTION	COMMENT BY CERMAQ	PROPOSAL
IV	1. Forage Fish Dependency Ratio calculation	The fishmeal yield factor is shown as 22.2 in the formula for FFDRm, but then it is stated below "The amount of fishmeal in the diet is calculated back to live fish weight by using a yield of 24%138. This is an assumed average yield.". Which factor is to be used: 22.2 or 24?	We support 24%

<u>Salmon Aquaculture Dialogue Standards Draft 2</u>
<u>Comments by the Coastal Alliance for Aquaculture Reform</u>

Dear Salmon Dialogue Steering Committee;

We congratulate you on reaching a 2nd draft in the salmon aquaculture dialogue as it is an accomplishment of merit even if agreement has not been reached yet and the process has not ended. The 2nd draft is an improvement over the first draft but the overall question remains as to whether this 2nd draft represents real improvement on the water and whether or not it will move the industry towards responsible production in over the long term. These are critical questions, not merely ones of philosophical interest, because clearly the impact of this standard in the marketplace will be to signal that the fish carrying the ASC label are environmentally and socially preferable in some meaningful way.

Furthermore, given the number and complexity of these standards there are additional challenges surrounding implementation and auditing that will need to be addressed at the ASC level. It is very difficult for stakeholders to come to final agreement without more clarity on how these standards will be managed, continuously improved, and be adapted as new information becomes available. Clarity on ASC mechanisms for managing monitoring data and transparency requirements are also needed as this information will be used for managing and verifying claims of compliance.

<u>General Comments</u>

<u>Use of the word "should"</u>
As per our previous comments in the first public comment period there are many "shoulds" remaining in the document and we want to make it <u>very clear</u> that they must be removed as there is no place for that word in this document. Please change all of them to "must" or "shall".

<u>Uncertainty and expense related to compromises in standards</u>
In many instances the standards represent a compromise between scientific certainty, cost, and difficulty of obtaining reliable information. These compromises must be highlighted consistently throughout the rationale so stakeholders can understand where these choices have been made. Additionally, where cost is a concern those costs must be estimated as part of the rationale. At no time have we ever tested the bounds of what "economically viable" truly means, and yet cost has been a common rationale for not taking certain actions.

<u>Closed containment</u>
Linked to the above is the fact that operators of closed containment facilities have invested real dollars in eliminating some of the uncertainties referred to above. Thus, they have avoided debates over uncertainty and erred on the side of internalizing costs that would otherwise be borne by the environment. This is a preferred approach and does away with the need to guess about impact or debate over the cost of monitoring and science to reach "certainty" about the magnitude of impacts and mitigation costs. This investment deserves to be recognized by clear areas of "preferential pass" options

and reduced monitoring costs for closed containment operators. It has been stated that the Dialogue wished to be “technology neutral” but when the assumption is that open nets are the only real way to do things, this is not truly “technology neutral.” This becomes especially important where the standards have had to stray from measurable performance standards to best management approaches, which the Dialogue was initially very strict about avoiding but which has crept in across several areas.

<u>30 Day Public Comment Period</u>

We would like to state our objection to a 30 day public comment period instead of the 60 days that has been followed in the other dialogues. Given that the Salmon Aquaculture Dialogue is the most difficult and possibly the most important dialogue, we believe that it’s important to get the best input possible. This short time frame has created difficulty in generating meaningful comment from a wide range of stakeholders. Given the time already committed to the process we think it’s unfortunate that an additional 30 days could not be found. We don’t agree that the impatience of retailers, the shortness of funding, or the pressure of deliverables are valid reasons. Good process is a critically important aspect of getting buy-in to the standards.

<u>Development of guidance and field testing</u>

We would also like to state our support here for the approach of finalizing all guidance documents before the standard is considered final. The guidance for this document will be a highly critical piece of work that needs appropriate Steering Committee supervision and the standards must not be signed off on by the steering committee until it’s complete. We would also suggest that the process seriously consider a 3rd public comment period to review the guidance once it’s completed as it is a detailed and important effort that has been underestimated by all of the dialogues to date. We understand there are time commitment and funding challenges but the importance of doing this right vs. quickly must be considered as this standard may set a bar that will be in place for a long time.

<u>Principle 1:</u>

1.1.1: Presence of documents demonstrating compliance with local and national regulations and requirements on land and water use.

The wording in this section needs to include “all applicable” before “local” and “laws and” after “national”.

<u>Rationale</u>

Laws are created by statutes that originate from legislative bills and regulations are standards adopted as rules to implement, interpret, or make the specific law enforceable. So, laws deal with the issue (e.g. environmental assessment, water quality, navigation) and regulations deal with specific elements of the law to be implemented. Therefore, to be complete, both need to be referenced.

The wording in this section needs to include “and environmental protection” after “water use”

Rationale

There are numerous laws governing environmental protection in Canada (like the *Canadian Environmental Protection Act*, the federal *Fisheries Act*, the *Canadian Environmental Assessment Act*, the *Navigable Waters Protection Act*, the *Ocean Dumping Act*, the *Migratory Birds Act*, the *Species at Risk Act*, the B.C. *Pesticide Control Act*, the *B.C. Wildlife Act*, the *B.C. Environmental Management Act*, etc…) that govern things other than land and water use such as protection of wildlife, deposits of deleterious substances and marine and freshwater pollution.

1.1.4: Presence of documents demonstrating compliance with regulations and permits concerning water quality impacts

The wording in this section must include "all applicable laws," before "regulations"

Principle 2

2.1.1

Brooks 2001 reported for BC salmon farms that Infaunal communities were relatively stable at redox potentials >0.0 mV so we agree with this but note that there are some natural areas where redox might actually be <0.0 mv. Therefore it might be a bit more appropriate and realistic to add some kind of comment that the standard should not be significantly different than at a reference station.

With regards to sulphide concentrations; the way that the indicator and standard are written is that sulphide values of say … 1000 mM ***outside*** the AZE would be acceptable. Turning once again to Brooks 2001, he noted free sediment sulfides were significantly correlated with total infaunal abundance (r= -0.41*), the number of taxa (r = -0.64*), and Shannon's index (r = 0.71*). **Decreases in the number of taxa were observed beginning at 300 µM S= and Shannon's index began decreasing more quickly at free sulfide concentrations > 520 µM S=**. We suggest a more appropriate acceptable standard outside the AZE should be 300 mM.

Recommend that the standard **outside** the AZE be " Redox Potential **≥0 mV** and/or Sulphide concentration **< 300 uM or not significantly different than reference station**."

Definition of Allowable Zone of Effect

The way AZE is defined in the standard is: "30 meters **OR** where a site-specific AZE has been determined using a valid modeling and video surveillance system, farms will use the site-specific AZE and sampling stations based on actual depositional patterns".

The rationale and attendant Appendix (Appendix 1) are only slightly more explicit in the description and reasoning behind setting the AZE. However, to really be effective and useful for measuring benthic impacts from farms the standard needs to be even more explicit in how the AZE is to be determined.

Further, it is anticipated by the Steering Committee that farmers will have 3 years from the date the standard is published to determine ACTUAL depositional patterns (as opposed to assumed or modeled ones) using field sampling/testing and/or video surveillance systems. That may be fine for a new farm just beginning production, but what about farms that have been operating at the same location for years prior to the standards being set? Many of these farms may already have an established footprint that far exceeds that which the standard anticipates and may still get certified by virtue of the rather lax requirement to determine what their actual benthic footprint may be.

The problem is that the impact zone from farms can vary greatly in distance and direction and the pattern is largely dictated by the tonnage of fish raised, the amount of feed used, the size and density of the waste feed particles, the force and direction of tidal flow and the configuration of the seabed (undersea "mounts", cliffs, and rock piles could impact direction and speed of flow and depositional patterns).

For example, Brooks (2000a) reported benthic infaunal community changes occurred up to a distance of 130 meters from a B.C. farm perimeter during the peak of salmon biomass (Moonbean – producing 1,200 mt). Brooks (2000b) reported increased sediment TVS and S= at distances up to 150 meters *down current* from "some" B.C. farms.

Brook 2001 cites literature from other parts of the world that reveals similar results. Weston (1990) reported a zone of reduced species enrichment extending to between 45 and 90 meters from a Puget Sound salmon farm producing 600 mt of fish/year. Other authors have reported adverse infaunal effects extending from 15 to 50 to even 100 m from farms.

Modeling can determine some patterns of distribution but not all. In fact, the SEPA DEPOMOD model (to which the SC refers) has, for the most part, been validated using a particulate tracer study on silty mud in sheltered sea loch conditions, which are typical under most Scottish fish farms. It has not been validated for many other kinds of substrates. The DEPOMOD model used by Fisheries and Oceans Canada does not even include a module that deals with benthic type. It only uses information about the farm configuration (cage dimensions and layout) and fish production (feed input, biomass, size), employs a particle tracking model (which distributes the wastes onto the ocean bottom using the sinking rate characteristics for the wastes, together with information about ocean currents). Actual measures of benthic impact such as free sulphide concentration in the sediments or indices of benthic diversity are used to compare model-derived sedimentation rates in order to establish semi-empirical relationships (see: http://www.pac.dfo-mpo.gc.ca/science/aquaculture/sok-edc/depomod-eng.htm), but they do not verify actual zones of deposition.

Even DFO acknowledges that the DEPOMOD model's outputs are uncertain and that the model has its limitations.

So, the problem in setting an arbitrary AZE of 30 meters remains. **Without either modeling and/or visual confirmation of the location, pattern and extent of a farm's footprint it would be easy to simply go and find some locations outside your 30 metre zone to take samples where there is no evidence of benthic impact and you pass**. Therefore, **it would be a no-brainer to simply accept the default**

standards that your farm's AZE is 30 meters and act accordingly. However your actual footprint could be up to 150 metres from your farm on a north-south (or north-northeast. Etc…), trending line.

This industry uses Remotely Operated Video (ROV) to assess benthic impacts and to inspect moorings. This technology can and should be used to determine the benthic footprint of a farm.

We would argue that if a farm wants to be certified under these standards then they should at the very least be required to establish their actual pattern and extent of benthic footprint using ROV and GPS and through sediment sampling using tracer elements (e.g. something in the food that is not found naturally in the environment – like lithium) as key indicators to distinguish actual fish farm waste from natural benthic sediments, then map their actual footprint using latitude and longitude and distance (all available on board the ROV and on tape) and they should be required to monitor regularly within that zone of impact at set sampling locations to ensure they do not exceed the set standards. Under this scenario, the AZE is still 30 meters from the edge of the net pen array but sampling would occur within the ACTUAL footprint, not a predicted or assumed one. The farmer would then locate and GPS in compliance points for subsequent sampling and monitoring.

Also, the sampling methodology outlined in the appendix is only really applicable to soft bottom sites. The SAD Steering Committee should consider the following changes (See below)

Appendix I: Methodologies related to Principle 2 and benthic testing

For Soft Bottom Sites

1. Sampling methodology for calculation of faunal index, macro faunal taxi, and supplied and redox, and copper. Grab sampling for the faunal index, macro faunal taxi measurements, and supplied and redox should be conducted at nine stations in duplicate during peak cage biomass.

- Two stations must be located at 0 m from the edge of the net pen array and within the defined AZE
- Three must be within the AZE, 25 m from the edge of the array of cages at slack tide. Of these three, one must be upstream and one downstream with respect to the direction of the dominant current, and the other must be to one side of the farm in a direction orthogonal to the dominant current
- Three must be 25m outside the AZE. Of these, one must be upstream and one downstream with respect to the direction of the dominant current, and the other must be to one side of the farm in a direction orthogonal to the dominant current
- One from a reference site located 500-1000m from the farm (edge of the array of cages), in similar water depth and substratum type (where this exists), and recorded using GPS

Copper sampling shall be conducted at the same locations outside the AZE as the other benthic sampling, at three stations outside the AZE, in duplicate. The reference site used shall also be the same. Timing shall also be the same, sampling at peak cage biomass.

For Hard Bottoms

- Paired 50 meter ROV transects should be run along the bottom both within and outside the defined AZE and compared with previous runs to look for changes to the kinds and quantities of mega fauna and macrophytyes, changes in sediment color, presence of organic sediments, presence of uneaten feed pellets and presence of Beggiatoa mats or opportunistic polychaete communities (e.g. *Capitella capitata*) along two transects (one following each of the dominant current directions).
- At each of three stations along the transect (0m, 25m and 50m from the net pen array) and at two reference stations, take at least 5 megafauna/macrofauna quadrat surveys (This consists of taking still images of "quadrats" along and adjacent to the transect line which are later used to visually identify and quantify macrofauna and macrophytes at each of stations).
- These data must then be subject to detailed statistical analyses (see for example Section 7 of Protocols for Marine Environmental Monitoring http://www.env.gov.bc.ca/epd/industrial/regs/finfish/pdf/reg_protocols.pdf) to determine whether the facility has had any statistically significant effects.

Criterion 2.2: Water quality in and near the site of operation

2.2.3

While we agree with the standard requiring weekly monitoring of nitrogen and phosphorous levels at the farm and at a reference site, there is no definition of how the reference site will be determined. We feel that there must be guidance on how reference sites will be determined. We note that it is stated in the **Additional Information** section to this criterion, the SAD technical working group on nutrient loading identified the potential link between nutrients around salmon farms and HABs as one that had yet to be established but around which there remained some uncertainty. New research into modeling of dissolved wastes flows from fish farm pens has been published[1] since the first SAD Comment Period. This new modeling tool could be utilized to determine the appropriate selection of reference sites and to assess the effects from farm-induced nutrient loading in the far field. We strongly advise that the Steering Committee task the SAD technical working group on nutrient loading to investigate the utility of this new research for resolving the uncertainty around nutrient loads, the potential link to HABs and farm-induced effects on anthropogenic cumulative loads into coastal water quality. Once an assessment has been made, we support including the use of this new modeling tool into the Standard.

Criterion 2.4: Interaction with critical or sensitive habitats and species

2.4.1

While it is appreciated that this criteria has been included, we would strongly suggest that it be aligned with the ShAD which requires a Biodiversity Inclusive Environmental Impact Assessment. If shrimp farmers are required to take such a step then salmon farmers must be required as well given the economic differences between the industries.

[1] S. Venayagamoorthy *et al* April 2001, Numerical modeling of aquaculture dissolved waste transport in a coastal embayment. Environmental Fluid Dynamics DOI: 10.1007/s10652-011-9209-0 http://www.springerlink.com/content/d1528228x7122x67

2.5.5
Strongly suggest defining "easily publicly available" wherever it occurs throughout the standard.

Principle 3
While this Principle is all about managing for impacts of pathogens on wild salmon stocks, the current draft is focused on almost exclusively on sea lice. An almost exclusive focus on sea lice undermines the goal of demonstrating minimized or eliminated risk of pathogen impact on wild fauna of concern. Furthermore, the trade off appears to be that to have stronger sea lice standards requires having weaker paracitcide standards.

Salmonids are not the only species of concern as there are other marine fish (herring, turbot, cod, etc…) and invertebrates (prawns, crabs, lobster) that live in close proximity to sea farms that can either be vectors for transmission of viruses and parasites to farmed fish or can themselves be directly impacted by viruses and/or parasites that are incubated on the farms (e.g. Infectious Pancreatic Necrosis in Atlantic salmon farms can affect a wide range of fish species including: Atlantic salmon, rainbow trout, brown trout, Arctic charr, halibut, cod, haddock and turbot. IPN has been identified as a significant disease problem in fish farms in Scotland and the problem is spreading rapidly). In addition there are numerous parasites other than sea lice that infect farmed salmon and are transferable to other fish (e.g. Gyrodactylus solaris, Parvicapsula, microsporidians, etc.).

We suggest adding a standard that is more specific to pathogen management such as:
Indicator
Active Participation in a region-wide fish health and pathogen monitoring program where information is openly shared amongst practitioners about possible disease outbreaks and/or the presence of new or novel pathogens or mutated strains of existing pathogens
Standard
Yes

The above indicator and standard must be coupled with a system must also be in place for the timely dissemination of information on disease outbreaks and/or the presence of new or novel pathogens to both government and non-government researchers looking at potential impacts on wild fish stocks.

Criterion 3.1.7
While we acknowledge the challenge of addressing this issue, CAAR suggests that neither option is appropriate in their current form. The relevant measure for sea lice is the additional infection pressure; the duration of wild fish exposure at a vulnerable stage to elevated levels of lice exposure. The SAD notes the importance of the initial determination of actual area-based maximum lice levels is an important step and we suggest that this should be accomplished before farms in an area are eligible for certification.

Proposed Standard: Background infection pressure and maximum lice levels are established for the area – yes
Proposed standard: Infection pressure does not exceed 10% above established background level for the area.
Proposed standard: Farms demonstrating separation from the wild environment (zero infection pressure) pass this standard.

While we strongly support the above, of the given options in the current draft, Option A is better because it is the most precautionary approach. While we appreciate the work that has gone into creating the two options, there are not enough studies that adequately predict the mortality thresholds for the salmonid species of concerns hence the ability to use Option B is questionable.

It is important to note that even with a mandatory level of 0.1 lice per fish, a massive farm or number of farms could still be causing harm to wild salmon. We would suggest one additional requirement that decertification occur if evidence of impact on wild salmon becomes available for farms that are employing the 0.1 threshold from farm-related lice in a region.

Footnote for 3.1 (Page 22)
Current wording of this footnote could mean aggregated data such as that on MHC website data is acceptable for this standard. The data must be in its raw form and this must be clarified in the standards document or the guidance

Please change the wording of the footnote to the following:
Commitment: At a minimum, a farm and/or its operating company must demonstrate this commitment through providing **the most relevant raw** farm-level data to researchers, granting researchers access to sites, or other similar non-financial support for research activities.

Rationale on Page 24 of 88 for 3.1
"The commitment to research required under 3.1.2 **will** (delete intends to) ensure farms are working with researchers and regulators to address the many gaps in understanding around a farm's interaction with wild populations."

Criterion 3.2 Introduction of non-native species
We believe that this criterion is not sufficient as it basically allows an exotic species to be utilized and does not set a precautionary standard on a very important global issue. We also think that deferring to the ASC on this issue is simply not acceptable, there is room to set a precautionary standard and it must be done.

We suggest the addition of the following standard with the following rationale:

3.2.2	Evidence of establishment or impact in adjacent ecosystems of exotic species	None

Suggested Rationale for 3.2.2

The SAD recognizes the significant concern about the release and establishment of exotic species under these standards and significant debate occurred over the issues associated with Atlantic salmon being farmed in the Pacific etc. The SC decided to allow non-natives to be farmed in areas where they are already widely used provided that no evidence of impact can be demonstrated. To be clear, this does not means that certified farms must be able to prove that they are not having an impact on local ecosystems or wild stocks, rather it is to allow for the opportunity for someone to prove that there is a problem should one arise or currently exists and is undetected. The SC believes that this is a more credible approach rather than simply allowing farms to use non-native species that are already in use. Under these standard farmers will be required to produce a basic analysis/ review of available information that demonstrates the risk of impact based on the biology of the species they are farming and the risk factors in their production area. This analysis/ review must be made publicly available as part of the audit report.

Definition of evidence: self reproducing population

Criterion 3.4 Escapes

This section must have a standard that requires the farmer to provide proof to the auditor that the fish that escaped were free of pathogens that could likely affect adjacent wild fish stocks. Proof would come in the form of companion fish health monitoring data/reports that would be required to be presented at the time an escape occurs so that the auditor can determine the condition and health of the fish at the time of the escape.

The SAD has definitely improved its escapes standards and that is should be acknowledged, and we accept 98% accuracy as starting point for the SAD standard. However, we think it's important that control over all fish inputs must be mandatory in the next iteration of the SAD standard. Without an understanding of how many fish enter the system, there is no way to verify the actual number of fish that have escaped into the marine environment.

Principle 4

4.2 Use of wild fish for feed

Our main concern surrounding the standards in 4.2 is that there is not sufficient rationale nor methods presented to justify the target metrics. As a steering committee member, we are familiar with the debate and understand that it is a compromise position but we remain concerned that a sufficient justification has not been presented. It is very important to stakeholders to understand how and why the metrics on such a critical issue were reached.

4.7 Non-therapeutic chemical inputs

Copper nets should not be allowed under this standard given that the target for these standards is approximately the top 20% of the industry. Net washers are not that uncommon in the industry and we don't see a justification as to why treated nets should be covered.

Principle 5:

5.4.4: If exotic diseases and /or parasites are detected on the farm or in the hatchery, evidence of increased bio-security measures that include restrictions on movement and evidence of strong disease management practices, including culling.

- This must be changed to read "if emerging, serious or exotic diseases or parasites are detected…"
- As things stand now, these actions are only required for "exotic" diseases and/or parasites.
- A list of "reportable" diseases needs to be developed and listed in an Appendix that includes all diseases that can infect local wild stocks. **We recommend that this list includes at minimum immediately notifiable pathogens and reportable pathogens that follow international standards and protocols (World Organization for Animal Health – OIE) and that local diseases of concern to wilds stocks be added.**
- If disease is or has been identified on the farm presently or in the past, fish health sampling, PCR and virology must be conducted on all wild fish at risk, migratory or resident or some sort of sentinel cage evaluation should be used to determine the risk of disease spread.

5.2.7 – WHO Antibiotics

We applaud the addition of a standard that addresses the use of critical antibiotics for human medicine. After reviewing the World Health Organization information on important antibiotics, antibiotic use in salmon farming indicates that a prohibition on "critically important" antibiotics is attainable for a large portion of the industry already. Of the four antibiotics known to be used in Canadian open net cage salmon farming, none are on the WHO "critically important" list. Only one of five antibiotics used by Norwegian producers and one of four used by Scottish producers fall within the "critically important category". The little information that is available on the Chilean's industry antibiotic use suggests it may be the hardest hit by this standard, although alternative drugs seem to be available.[2]

We strongly advocate that a cap is needed on the use of drugs in the "highly important" category. The draft standard only requires that these antibiotics are prescribed by a vet with no requirement to scale back their use over time. This goes against the advice of the expert report commissioned by the SAD steering committee to assist in developing strong standards on chemical use. The report recommends that "classes of antibiotic compounds used for treatment of human diseases should not be used (or should be used with extreme reluctance) in aquaculture production of salmon." [3] To justify any claims that the SAD standard is "best practice" and in line with expert recommendation, it is critical that the Steering Committee maintain the current prohibition on critically important drugs while requiring a scheduled elimination on WHO-designated "highly important" antibiotics.

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[2] This information is taken from an internal datasheet compiled by the SAD steering committee from a number of sources including the Scottish Executive, Norwegian Ministry of Fisheries, etc.

[3] http://www.worldwildlife.org/what/globalmarkets/aquaculture/WWFBinaryitem8842.pdf

Principle 6

Women's issues
The standards need to address any special women needs in labour; such as maternity rights.

Worker Accommodation
Numerous salmon farms and their workers are established in remote areas and there needs to be a standard to ensure adequate living conditions. The Shrimp Aquaculture Dialogue addresses this issue in 4.11 and we direct the Steering Committee there as a first step.

6.6

We are concerned that the "basic living wage" is not defined or definable. The idea that the employer sets it "in consultation" with workers is not acceptable. The standard must read that, it "must be mutually agreed between **employers** and workers, with binding arbitration, by an independent third party agreed by both parties, if there is no consensus", so it requires an honest negotiation. Regular wage rates must be paid for up to a 40 hour week, with time-and-a-half paid for overtime beyond 40 hours. Regardless, in no case should wages be below that required by SA8000.

We also suggest that we are trying to work towards a 40 hour week in the entire developed world. This standard must find ways to lift Chile and not allow poor practices in Chile to continue. This concept is written into our Canadian employment standards for ALL workers. Anything less is below basic labour standards established for decades.

6.6.2

Not acceptable that they are "Working towards" paying basic living wage. They must be forced to negotiate this and be paying it (see "mutually agreed" above).

6.7

Needs to include a provision that ensure that contracts are known/understood by both sides e.g. through paper (held by both parties) or independent witnesses (in verbal agreements).

Numerous salmon farms make use of labour in sub-contracting form such as divers and cleaners that are usually employed through an intermediate person or company that provides a team of workers specific to the job (diving, cleaning, sorting, etc.). When sub-contractors abuse workers and/or violate essential workers rights, then the farmer hiring these people is (in-avertedly) associated with that abuse and therefore a standard to guard against this practise is required. Farmers can check who it is they use in sub-contracting and whether or not that person or company itself is performing social responsibility or not. The issue is mentioned in the title of criterion 6.7 but an indicator on this is lacking. Please see the ShAD 4.9.4 for an example how this can be done under a farm-level standard.

6.8 and 6.9

The communication system between management and workforce (open, transparent, issues related to all workers) needs to be addressed. Our suggestion is to include a criterion/indicator that says something about open and (sufficiently) frequent worker-management meetings. Again the ShAD has standards on this issue.

6.10

There is a need to add indicators that address the issue of shifts and 24 hour standby times. There are provisions limiting these to avoid/prevent and abuse of workers (E.g. stand-by time is explicitly included as 'working time'). Overtime must be paid at time-and-a-half as all Canadian workers get and the work week must 40 hours per week not 48.

6.11

This standard is quite vague. "Encourages and sometimes supports" is rather meaningless and unenforceable and the standards needs more clarity which could happen in the guidance but overall improvement is needed.

Principle 7

7.2.1

The definition of 'effective' grievance mechanism in the footnote could be strengthened by referring to the 7 principles outlined by John Ruggie, UN Special Rep on Business and HR. These principles are highlighted in an UN document (http://www.business-humanrights.org/media/documents/ruggie/ruggie-guiding-principles-21-mar-2011.pdf).

7.2.3

This criterion is not fully in compliance with international law. The UN Declaration on Rights of Indigenous Peoples (UNDRIP) is very clear on requiring free and prior informed prior CONSENT (FPIC) from indigenous people before a development, in this case a salmon farm, is undertaken on ethnic/indigenous lands. Some countries (e.g. Canada) have this within their national laws. Even then, also outside IP areas, we can and should expect a 'responsible' salmon aquaculture standard to follow the guidelines adopted by the IFC (the corporate financing arm of the World Bank) in determining that free and prior informed consultation shall have taken place (also FPIC, but the 'C' has a slightly different meaning). The criterion should, therefore, include two specific situations: (1) in IP areas, where 'free and prior informed consent' is required, and (2) in all other areas, where 'free and prior informed consultation' is mandatory. There are guidelines that can be provided in footnotes. E.g. http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/p_StakeholderEngagement_Full/$FILE/IFC_StakeholderEngagement.pdf

http://unpan1.un.org/intradoc/groups/public/documents/cgg/unpan026197.pdf

http://pdf.wri.org/breaking_ground_engaging_communities.pdf http://pdf.wri.org/development_without_conflict_fpic.pdf

http://www.oxfam.org.au/resources/pages/search.php?search=free+prior&Submit=%C2%A0%C2%A0Search%C2%A0%C2%A0

The UN Declaration calls for the respect of FPIC and there is no reason why the SAD should justify a departure from this international convention when it is not seeking to certify more than 20% of the global industry. FPIC means Free Prior Informed Consent. This standard violates 2 of the 4 words and we don't believe it to be acceptable under these standards. The Rationale claims to be consistent with the UN declaration but it is not consent if the "in process" remains.

Page 61 Footnote

This is a bad example as it is not common for a freshwater resource to be blocked by the activities of a salmon farm other than a hatchery. Please use a more relevant example such as pollution from salmon farms impact traditional clam harvesting sites.

Appendix II: Area based management scheme

From page 74 of 88

Fallowing: Coordination of fallowing to help break disease cycles with a "**substantial**" period of time when there are no farmed salmon in the "**entire**" area in the water.

Appendix VI: Transparency of farm-level performance data

The transparency requirements do not specifically mention transparency in reporting of disease outbreaks and/or treatment to the public in a timely fashion.

Further, the requirement for transparency for farms seeking certification should exceed the requirements for transparency that may be determined by things like license conditions imposed on the farmer by a government agency.

We have found that here in Canada, promised transparency through government regulation is being severely hampered by industry and government interpretation of "Access to Information Legislation" and the need to have all documents translated into both of the country's official languages before they are released.

Smolt Standards

CAAR would like to state that it fully supports the current smolt standards and would oppose any change to these standards.

Dear Katherine Bostick

I am attaching COAST's comments on the final draft standards. There are additional points we wish to make which do not easily fit into the form, and there is no additional area for general comments on the whole. Firstly COAST, a marine community based stakeholder, is very pleased that at least the industry has talked with NGOs etc about the lack of any world-wide standards for salmon aquaculture. After the disasters in Chile, and disease in several areas of the world, it has come at an opportune time for the industry. This has to be a positive step forward. I attended, for COAST, the dialogue in Edinburgh. It was clear the dialogue was being driven by demands from outside the industry to improve its standards. It is therefore really regrettable that these standards will not be enforceable to the farms in operation now. In 2009 alone, for example, 144,247 tonnes of Atlantic salmon was produced at 254 active sites in Scotland, many of them with poor records on disease, hygiene, escapes and general housekeeping around the sites.

Quotes from your website are in Red:

Total salmon production has increased three-fold since 1980 to meet this demand. The largest growth has been in farmed, not wild caught, salmon. Approximately 60 percent (1.26 million metric tons) of the world's salmon comes from fish farms.

So at least 1.26 million metric tonnes will not be covered by the new standards since in your literature these will only apply to those farms developed once the standards are in place.

Fish caught to make fishmeal and oil currently represent one-third of the global fish harvest. (my underline)

As a marine community organisation interested in biodiversity and sustainability of fisheries, it is disturbing to see these figures, and again the standards will not immediately impact on this total. We also know that substitution with soy has huge implications for farms especially for artisan farmers in South America. Their sustainability and life chances have been hugely impacted. Land grab is not confined to fish farmers, but multinational salmon farmers are certainly implicated. Further, soy increases the fat content of salmon, so less healthy!

Draft standards that seek to minimise or eliminate the key negative environment and social impacts of salmon farming, while permitting the industry to remain viable.

In reading the draft standards it is clear that containment is not seen as a viable economic possibility. Yet the dilute and disperse methods to reduce the impact of pollution around the fish farms has been deemed unacceptable on land to water courses in the UK and many other countries since the 1970s. Moving farms to deeper water is no solution.
EIAs should encompass all salmon farms in a vicinity so accumulative effects can be modelled.
Chemical therapeutants and the rise of resistance in fish lice is a serious ongoing problem. Much lower cage biomass is required. The rush in the aquaculture industry to maximise profit by intensification and increased biomass is having long term impacts on biodiversity in the marine environment (benthic and planktonic), wild salmon populations and their smolt stage.

One main concern is compliance, especially around the islands of Scotland. SEPA will have the responsibility for water condition and standards. The new Aquaculture Stewardship Council must be more effective in raising standards than the present MSC. This can only be done if the certifiers are prepared to decline certification through rigorous inspection. If these standards are to be managed in the manner of the MSC standards, COAST has real concerns. Quite frankly MSC certification is now considered by many to be purely part of marketing. As I am sure you are aware unsustainable fisheries are now marketed as sustainable with the "magic" Blue Label. Whilst these Principles are clearly signalled here as:

- Develop and implement verifiable environmental and social performance levels that measurably reduce or eliminate the key impacts of salmon farming and are acceptable to stakeholders
- Recommend standards that achieve these performance levels while permitting the salmon farming industry to remain economically viable

It is clear the industry is not sustainable in environmental terms, and has an enormous carbon footprint .Yet already in the press the salmon farming industry is telling the world it is a "sustainable" industry. The language in the document does make it clear that the industry seeks to minimise key negative social and environmental impacts; these words imply the recognition that it is not a sustainable industry, nor ever organically approved, giving that the use of chemicals for antifouling, therapeutants for disease, overfished stock as a main component in feed, and a large carbon footprint involved in all the transport of feed, fish, and markets. We therefore hope this dialogue is not a prelude to launching sustainable salmon farms with some sort of new label.

It has always been stated by multinational salmon farm owners, for example the Norwegians, that they adhere to the standards of the country in which they operate (even when there are no standards!) COAST considers that any multinational company should adhere to the highest standards enforced by law of their own country. We hope these standards will ensure there is a higher standard at every fish farm site.

But so far, this is an improvement on what went before. For that COAST is hopeful that these are the first steps.
Yours sincerely
Dr Sally Campbell
Vice chair COAST

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Dr Sally Campbell
*Organization/Company: Community of Arran Seabed Trust (COAST), a community stakeholder working for sustainability of inshore waters
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's
e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1	1.1	At least as high standards as their country of origin's standards, if they are higher than international standards- eg, Norwegian	

		companies in Chile and Scotland	
Principle 2			
Principle 3			
Principle 4			
Principle 5			
Principle 6			
Principle 7	Communities 7.3 Communities 7.1	Local media as well as community should be informed, especially of disease The use of "sweeteners" to communities and local planners, especially at planning stage be forbidden	Again our concern is that this will not be required of present functioning fish farms
General comments	The whole	Scotland has already 100s of salmon farms yet these standards will not apply since they are already in operation. No wonder multinationals are rushing for planning permissions in Scotland before these standards come in	These standards must be introduced to ALL salmon farms even those in operation now.

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3			

Principle 4			
Principle 5			
Principle 6			
Principle 7			
General comments			

WWF
salmonaquaculture@wwfus.org
katherine.bostick@wwfus.org

14th June, 2011

Comment form for Draft Salmon Aquaculture Dialogue Standards

Dear Katherine,

Compassion in World Farming welcomes the opportunity to comment of the draft SAD standards. We are delighted to see the inclusion of social and ethical issues, in addition to environmental sustainability criteria, in the standards. To ensure consistency with recent national and international regulations and codes, it is essential for animal welfare rules to be included in the SAD standards.

We note that many national and international laws, regulations and codes, give clear direction on social and ethical issues relating to farmed fish. The OIE code the Welfare of Farmed Fish states that "*The use of fish carries with it an ethical responsibility to ensure the welfare of such animals to the greatest extent practicable.*"[i] Guidance and laws to protect the welfare of farmed fish sit alongside the need to improve the environmental performance of fish farming.

Most aquaculture can be considered to be a form of factory farming, likely to involve tens of billions of fish each year worldwide. The welfare of fish is of great importance, during the breeding, growing-on and the slaughter of these animals. We propose that the SAD standards include minimum standards on the slaughter of fish, including an assurance that farmed fish are stunned before being killed and that death is confirmed before the gutting process begins.

Fifty years from inception, WWF is widely perceived by its supporters and donors as an organization which values animal welfare. We urge WWF to take full account of animal welfare in the SAD standards. As an organization with great brand recognition and opportunity to influence, we consider an absence of good animal welfare standards in a WWF certification process may erode the implementation of the current legislation on animal welfare. Consumers may assume that a WWF founded accreditation scheme would include a responsible animal husbandry and slaughter standards for the fish they are consuming.

We offer further detail in the form attached and look forward to constructive engagement with WWF and the Salmon Aquaculture Dialogue process in the future.

Best wishes,

Emily Lewis-Brown.

Research Manager.

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[i] http://www.oie.int/index.php?id=171&L=0&htmfile=chapitre_1.7.1.htm

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Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Emily Lewis-Brown, Philip Brooke
*Organization/Company: Compassion in World Farming
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1 – National laws and regulations		CIWF welcomes the principle on adherence to laws. We draw attention to the OIE standards code[1], FAO guidance[2] and EU Directive[3] which explicitly include fish welfare standards for the production of fish and the slaughter of fish. The OIE code covers up to least 173 nations. National laws and regulations on animal welfare also exist; the USA has standards for humane slaughter of livestock and farmed animals which	Unfortunately, the existing national and international standards on animal welfare are often not enforced. Compassion considers that any new standards which do not include animal welfare as an explicit standard may undermine and further erode the existing standards such as those of the OIE and EU. To ensure compliance with these international standards, all standards and certification

		could also be applied to fish[4]. The UK has legislation on welfare standards for farmed fish[5]. In these laws, good standards of fish welfare and fish slaughter are linked to the sentience of fish, social values, ethics, safety of staff, safety of fish products and environmental responsibility.	processes for aquaculture should include a principle and explicit standards on animal welfare during all stages of the life cycle and slaughter. See below for further detail.
Principle 2 – Environment and conservation		CIWF welcomes this principle on environment and conservation. However, CIWF finds aquaculture has many environmental impacts, in particular it has a high carbon footprint, with, for example, a tone of UK farmed salmon having a carbon footprint of c,3T of CO_2-e[i], similar to some livestock products. It also has a high local and region impact on the environment and the capture of wild fish for fishmeal has an unacceptably high impact on the conservation status of wild fish populations. In general, each of these impacts is less for omnivorous fish such as carp than pisciverous fish such as salmon and trout. For these reasons, alternative and low impact food sources should be found for salmon in more sustainable aquaculture systems. .	The standards and certification scheme should be limited to qualitative wording such as 'towards sustainable' rather than giving the impression that any farmed salmon product has achieved absolute sustainability *per se*, unless it can be demonstrated to have little or no impact on wild fish populations through accidental releases, pollution of any kind and the capture of wild fish for fish meal can be sustained with minimal impact. To qualify as sustainable, aquaculture would also need to sustained by the environment and climate, as well as meeting wider social and animal welfare principles. Compassion welcomes this principle also to ensure that the pursuit of one fishery cannot be undertaken with such a narrow definition of sustainability as to exclude the impacts on another fishery as has been for the case of nephrops in the UK. One nephrops fishery in the UK which is MSC certified and, while the nephrops fishery is in itself sustained over time, it is at the expense of most other marine species in the Firth of Clyde which suffer a very high by-catch and discard rate. This cannot be considered to be sustainable in the wider sense, and it is reassuring to see a broader view of sustainability adopted in these aquaculture guidelines. The definition of

			sustainability is evolving and standards for aquaculture must include the feedstuffs which input into the system and the welfare of the animals in the fishmeal as well as the welfare of the fish being farmed for human consumption.
Principle 4 – Efficient use of resources		CIWF welcomes the principle on resource efficiency. However, due to the high carbon intensity of farmed salmon, plus the high use of wild caught fish as a source of fish meal, and use of water and energy during processing, CIWF does not, in general, consider salmon farming as resource efficient.	In the standards, qualified phrasing such as ‘more resource efficient’ and ‘less resource efficient’ should be utilized in place of absolutes, such as ‘resource efficient’.
Principle 6 – Socially responsible		CIWF welcomes the principle on social responsibility and labour rights. Within the sustainability agenda, social and ethical issues cover a wide range of considerations. Human rights and humane behaviours are of central importance. To achieve and support socially responsible societies, it is vital to recognize the sentience of animals, including their ability to suffer. When we create standards to drive sustainability and hold these up as examples of good practice, it is important to ensure that we recognize our duty to act in a humane way towards other animals, particularly those we chose to farm to food. We breed and raise these animals and are wholly responsible for their life and death. We have a duty to care for them during life and death and these animals experiencing pain or suffering as far as is at all possible. The duty of care towards animals is central to the text below from the OIE, UN, EU, USA and UK.	WWF is strongly perceived by its supporter and donor base as an organization which takes account of animal welfare issues. This has been the case since its inception, with Sir Peter Scott as the founding chair – passionate about conservation and compassionate towards animals. WWF holds a high profile and brand recognition, it holds the trust of both government and industry; with this high credibility comes the responsibility of influence. We urge WWF to recognize the contributions and opinions of many stakeholders who have expressed the view that animal welfare is key to a certification process for aquaculture and we propose that animal welfare be included as an explicit Principle in the standards. This principle on social responsibility should cross reference to a new and additional principle on Animal Welfare in all standards on aquaculture. Suggestions for this principle in aquaculture are below.

Principle 7 – conscientious citizen		CIWF welcomes this principle. Much of our opinion on principle 6 also applies here. To avoid duplication, please consider that our responsibility as a conscientious citizen should be extended towards the animals we chose to farm and eat. High farm animal welfare standards have a positive impact on the animals we farm and on our own wellbeing. Additionally, the EFSA finds that 'in principle, good on-farm animal welfare assurance contributes to the resulting food safety assurance.'[ii]	Principle 7, on being a responsible citizen, should cross reference to a new and additional principle on Animal Welfare in all standards on aquaculture. Suggestions for this principle in aquaculture of salmon are below.
Principle 8 – Animal welfare and health	This is an additional Principle which we propose be included in the standards. It would require dialogue amongst the SAD and some refinement.	The basis of this Principle is founded on a similar Principle in the Trout aquaculture standards with some additional details to ensure full recognition and adherence to animal welfare.	The proposed criteria for this Principle are outlined below for the breeding, rearing and slaughter of fish in aquaculture.
General comments		It is increasingly accepted that fish are sentient creatures, such as their inclusion in the Libson Treaty[iii] and that any fish farming system, if it is to be considered humane or sustainable, must incorporate sufficient standards of animal welfare. Progress has been made on securing standards for animal welfare standards in fish farming. The World Organisation for Animal Health (OIE), has developed international standards for the humane	Compassion in World Farming proposes that WWF incorporates key animal welfare criteria in the form of a new Principle, 8, into the certification process. Additionally, it would be advisable to partner with animal welfare specialists or certifiers, to ensure that animal welfare is fully incorporated before any aquaculture farm for any fish species receives a WWF or ASC certification. If animal welfare cannot be included in the form of a new and additional Principle, it

		slaughter of farmed fish. Organic certifying bodies such as the Soil Association in England and Wales include strict welfare standards for aquaculture[iv] . All the main UK supermarkets require farmed fish to be slaughtered humanely, a key indicator of animal welfare. 70% of Scottish salmon is now reared to RSPCA Freedom Food standards.	should be included under Principle 6 and 7 with the following criteria and indicators for measuring performance against the standard.

Proposed Principle 8 : Animal welfare standards

To be considered sustainable, any farming system must also be humane. Consumers cannot be recommended to consume animal products, including fish, which are not produced according to the animal welfare standards below, in addition to environmental requirements relating to oxygen and waste levels.

1. Humane slaughter requirements in line with those developed by the OIE. All farmed fish should be slaughtered humanely by such methods as percussive stunning followed by bleeding or electrical stun/killing. The use of pre-slaughter sedation, e.g. using Aqui-S, followed by humane killing, should be considered. Farmed fish should **never** be:
    - Left to suffocate
    - Live chilled
    - Packed in ice, gutted or processed in any other way whilst still alive
    - Stunned using carbon dioxide
    - Bled without prior stunning

2. Lengthy pre-slaughter starvation is unacceptable. Salmon should not be starved for more than 72 hours before slaughter.
3. Live fish should not be transported over long distances. Transport must be kept to an absolute minimum and conducted humanely.
4. Crowding, handling and grading are stressful and can cause injuries. Accordingly, they should be kept to a minimum. Fish should only be removed from water when absolutely necessary and should not be kept out of water for more than 15 seconds unless anaesthetised. Fish should not be kept crowded before slaughter for more than two hours.
5. Stocking densities should be sufficiently low to avoid stress, aggression, injuries including fin damage and poor water quality. The maximum level for salmon in sea cages should normally be 10kg/m3, increasing to 15 kg/m3 for farmers who can demonstrate a high welfare status including low levels of injuries, disease, parasitic load and mortality.
6. Breeding fish should always be anaesthetised before being stripped of sperm or eggs.

7. Biotechnology techniques involving chromosome manipulation, such as sex reversal or rendering fish sterile through triploidy should not be permitted. The same applies to genetic modification.
8. Selective breeding for production including faster growth should not be carried out at the expense of health or welfare.
9. Wrasse should not be caught from the wild to manage parasites in fish farms, nor should chemicals be used which are stressful to fish. Parasite levels should be controlled using a range of management techniques including long fallow periods between each group of fish, synchronised between farms in any one area.

Use of fishmeal

Animal products from sources which are not both humane and environmentally sustainable should not be used in farming. Fishmeal and oil from species that have been purposely fished from the wild for this industrial purpose are very unlikely to meet both of these criteria.

Where fishmeal or oil are used in the diets of carnivorous fish such as salmon or trout, or omnivorous fish such as tilapia, they should be sourced from waste fish off-cuts and not from purposely caught wild fish.

Sources of information and relevant excerpts

INTERNATIONAL : The World Organisation for Animal Health OIE

[1] OIE slaughter standards: http://www.oie.int/index.php?id=171&L=0&htmfile=chapitre_1.7.3.htm

Since May 2005, the World Assembly of OIE Delegates (representing the 178 Member Countries and Territories) has adopted seven animal welfare standards in the *Terrestrial*Code and two animal welfare standards in the OIE *Aquatic Animal Health Standards Code* (*Aquatic Code)*. These standards cover:

- The welfare of farmed fish during transport
- The welfare aspects of stunning and killing of farmed fish for human consumption.
-

http://www.oie.int/en/animal-welfare/animal-welfare-key-themes/

The OIE 2010 Aquatic Animal Health Code

SECTION 7
WELFARE OF FARMED FISH

The use of fish carries with it an ethical responsibility to ensure the welfare of such animals to the greatest extent practicable.

Persons engaged in the handling, stunning and killing of fish play an important role in their welfare. Personnel handling fish for killing should be experienced and competent in the handling of fish, and understand their behaviour patterns as well as the underlying principles necessary to carry out their tasks. **Some stunning and killing methods may pose a risk to the personnel; therefore training should cover occupational health and safety implications of any methods used.**

Article 7.3.6.

Stunning and killing methods

1. General considerations

1. The *Competent Authority* should approve the stunning and killing methods for fish. The choice of method should take account of species-specific information where available.
2. All handling, stunning and killing equipment should be maintained and operated appropriately; it should be tested on a regular basis to ensure that performance is adequate.
3. Effective stunning should be verified by the absence of consciousness.
4. A backup stunning system is necessary. If mis-stunned, the fish should be re-stunned as soon as possible.

5. Stunning should not take place if killing is likely to be delayed such that the fish will recover or partially recover consciousness.

6. While absence of consciousness may be difficult to recognise, signs of correct stunning include i) loss of body and respiratory movement (loss in opercular activity); ii) loss of visual evoked response (VER); iii) loss of vestibulo-ocular reflex (VOR, eye rolling).

2. <u>Mechanical stunning and killing methods</u>

1. Percussive stunning is achieved by a blow of sufficient strength to the head applied above or immediately adjacent to the brain in order to damage the brain. Mechanical stunning may be achieved either manually or using specially developed equipment.

2. Spiking or coring are irreversible stunning and killing methods of fish based on physical damage to the brain by inserting a spike or core into the brain.

3. Shooting using a free bullet may be used for killing large fish (such as tuna). The fish may either be crowded in a net and shot in the head from the surface, or individual fish may be killed by shooting in the head from under the water (commonly called lupara).

4. Mechanical stunning is generally irreversible if correctly applied.

3. <u>Electrical stunning and killing methods</u>

1. Electrical stunning involves the application of an electrical current of sufficient strength, frequency and duration to cause immediate loss of consciousness and insensibility of the fish. The conductivity of fresh and brackish water varies, so it is essential to establish the parameters of the electrical current to ensure proper stunning.

2. The electrical stunning device should be constructed and used for the specific fish species and their environment.

3. Electrical stunning may be reversible. In such cases fish should be killed before consciousness is recovered.

4. Fish should be confined beneath the surface of the water, and there should be a uniform distribution of electrical current in the stunning tank or chamber.

5. In semi-dry electrical stunning systems, fish should enter the device head first to ensure rapid and efficient stunning.

4. <u>Other killing methods</u>

The following methods are known to be used for killing fish: chilling with ice in holding water, carbon dioxide (CO_2) in holding water; chilling with ice and CO_2 in holding water; salt or ammonia baths; asphyxiation by removal from water; exsanguination without stunning. However, they have been shown to result in poor fish welfare. Therefore, it is preferable to use the methods described in points 2 and 3 of this Article, as appropriate to the fish species.

http://www.oie.int/index.php?id=171&L=0&htmfile=chapitre_1.7.1.htm

INTERNATIONAL : FAO

[2] Recent evidence suggests that external stressors and painful stimuli elicit aversive states in fish, as they do in birds and mammals (Sneddon, 2003; Braithwaite & Huntingford, 2004; Chandroo et al., 2004), even though these may differ in degree from those experienced by higher vertebrates. In any event, a wide range of organisations in Europe now have fish welfare on their agenda including national governments, NGOs and the Council of Europe.

http://www.fao.org/fileadmin/user_upload/animalwelfare/global%20perspective.pdf

EUROPE : COUNCIL DIRECTIVE 98/58/EC

[3] Council Directive 98/58/EC concerning the protection of animals kept for farming purposes

Article 2

For the purposes of this Directive the following definitions shall apply:

1. 'animal': any animal (including fish, reptiles or amphibians) bred or kept for the production of food, wool, skin or fur or for other farming purposes;

Article 3

Member States shall make provision to ensure that the owners or keepers take all reasonable steps to ensure the welfare of animals under their care and to ensure that those animals are not caused any unnecessary pain, suffering or injury.

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1998L0058:20030605:EN:PDF

EUROPEAN : EFSA

Safety of farmed fish and fish products is influenced by farming conditions, pre-slaughtering practices and stunning/killing operations.

In other words, in principle, on-farm animal welfare assurance contributes to the resulting food safety assurance."

After slaughtering the biochemistry of the muscle post-mortem is influenced by the method used in pre-slaughter handling and stunning/killing of fish and this may have an influence on the microflora of the final product.

http://www.efsa.europa.eu/fr/efsajournal/doc/1190.pdf

EUROPE : Treaty of Lisbon

Article 13

In formulating and implementing the Union's agriculture, fisheries, transport, internal market, research and technological development and space policies, the Union and the Member States shall, since animals are sentient beings, pay full regard to the welfare requirements of animals, while respecting the legislative or administrative provisions and customs of the Member States relating in particular to religious rites, cultural traditions and regional heritage.

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:083:FULL:EN:PDF

NATIONAL : USA

[4] USA Humane Slaughter Act

The Congress finds that the use of humane methods in the slaughter of livestock prevents needless suffering; results in safer and better working conditions for persons engaged in the slaughtering industry; brings about improvement of products and economies in slaughtering operations; and produces other benefits for producers, processors, and consumers which tend to expedite an orderly flow of livestock and livestock products in interstate and foreign commerce. It is therefore declared to be the policy of the United States that the slaughtering of livestock and the handling of livestock in connection with slaughter shall be carried out only by humane methods.

No method of slaughtering or handling in connection with slaughtering shall be deemed to comply with the public policy of the United States unless it is humane. Either of the following two methods of slaughtering and handling are hereby found to be humane:

(a) in the case of cattle, calves, horses, mules, sheep, swine, and other livestock, all animals are rendered insensible to pain by a single blow or gunshot or an electrical, chemical or other means that is rapid and effective, before being shackled, hoisted, thrown, cast, or cut; or

http://www.animallaw.info/statutes/stusfd7usca1901.htm

NATIONAL : UK

[5] Animal Welfare Act

The introduction to this Act, except subsections (4) and (5), specifies that "animal" means a vertebrate other than man:

> *"Introductory*
> **(1) Animals to which the Act applies**
>
> (1) In this Act, except subsections (4) and (5), "animal" means a vertebrate other than man." …
>
> (5) In this section, "vertebrate" means any animal of the Sub-phylum Vertebrata of the Phylum Chordata and "invertebrate" means any animal not of that Subphylum.

Fish are vertebrates (along with amphibians, reptiles, birds and mammals).

The Act is here: http://www.legislation.gov.uk/ukpga/2006/45/pdfs/ukpga_20060045_en.pdf

[The Animal Welfare Act] makes owners and keepers responsible for ensuring that the welfare needs of their animals are met.

These include the need:

- For a suitable environment (place to live)
- For a suitable diet
- To exhibit normal behaviour patterns
- To be housed with, or apart from, other animals (if applicable)
- To be protected from pain, injury, suffering and disease

http://archive.defra.gov.uk/foodfarm/farmanimal/welfare/act/index.htm

DEFRA

The way we treat animals is an important reflection of the values of our society. This means we all have a stake in improving the national level of animal health and welfare. http://www.defra.gov.uk/food-farm/animals/

UK FAWC

Five Freedoms

The welfare of an animal includes its physical and mental state and we consider that good animal welfare implies both fitness and a sense of well-being. Any animal kept by man, must at least, be protected from unnecessary suffering.

We believe that an animal's welfare, whether on farm, in transit, at market or at a place of slaughter should be considered in terms of **'five freedoms'**. These freedoms define ideal states rather than standards for acceptable welfare. They form a logical and comprehensive framework for analysis of welfare within any system together with the steps and compromises necessary to safeguard and improve welfare within the proper constraints of an effective livestock industry.

1. Freedom from Hunger and Thirst - by ready access to fresh water and a diet to maintain full health and vigour.

2. Freedom from Discomfort - by providing an appropriate environment including shelter and a comfortable resting area.

3. Freedom from Pain, Injury or Disease - by prevention or rapid diagnosis and treatment.

4. Freedom to Express Normal Behaviour - by providing sufficient space, proper facilities and company of the animal's own kind.

5. Freedom from Fear and Distress - by ensuring conditions and treatment which avoid mental suffering.

SOIL ASSOCIATION

Soil association standards on farmed fish slaughter

You must

- make stock instantly insensible as soon as you take them from the water
- make sure staff are skilled to perform their tasks efficiently and humanely
- carry out strict hygiene procedures during slaughtering and evisceration, and
- dispose of blood, viscera, disinfectants and unclean water in a way that does not harm wildlife, farmed fish or the environment

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[i] Pelletier *et al*. 2009. *Environ. Sci. Technol* 43. http://www.engr.uvic.ca/~ndjilali/Pelletier%20et%20al-Salmon%20LCA-2009.pdf

[ii] http://www.efsa.europa.eu/fr/efsajournal/doc/1190.pdf
[iii] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:083:FULL:EN:PDF
[iv] http://www.soilassociation.org/LinkClick.aspx?fileticket=pM14JxQtcs4%3d&tabid=353

Dear Katherine Bostick,

The Stichting Vissenbescherming (the Dutch Foundation for the Protection of Fish) fights against the enormous violations of the welfare of fish all over the world. Those violations also occur in fish farms with salmon. We cannot understand and cannot accept that the Standards for responsible Salmon aquaculture, made by the Salmon Aquaculture Dialogue, don't include fish welfare. It should be the most important subject for these standards, as fish are the most important subjects of aquaculture. We believe that it's possible to include fish welfare in these standards and think that that should be done before they are given to ASC to be used for certification. As long as fish welfare is excluded we have no choice and will oppose ASC as a certification scheme.

We red (the draft of) the very critical remarks that the Fair-fish association from Switzerland made on this second draft and support that remarks.

With best regards,

Paul Denekamp

Board Member of the Stichting Vissenbescherming

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fairness with the fish we eat

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June 14, 2011 (by EMail)

Comments on the second draft of standards for responsible Salmon aquaculture by the Salmon Aquaculture Dialogue (SAD2)

Dear Katherine
Dear members of the FTAD steering committee

Thank you for the opportunity to comment on your second draft again.
Like the first time, we focus on the two following issues.

Animal welfare

> *SAD2, page 7*
> *Animal welfare (i.e., farmed fish welfare and wildlife interactions, including treatment of and impacts on predators) has been raised by some stakeholders as an issue for the SAD to address. Wildlife interactions will be addressed under Principle 2. The SC has decided, however, not to comprehensively address farmed fish welfare in the standards document, as the SC believes that 1.) farmed fish welfare does not fall under the mandate of the SAD and was not part of the rationale for creating the SAD, 2.) the SC does not have appropriate expertise on the issue, 3.) other fish welfare standards and processes already exist, and 4.) there is potential to partner in the future with other certification programs that address farmed fish welfare. The SC expects that some aspects of farmed fish welfare will be addressed, indirectly, under the standards (e.g., through several environmental and fish health standards).*

Draft 2 does still not directly address animal welfare. It is true that some other standards adress this, but they represent but a very small part of the market, so this is rather a weak

excuse as in reality, practically all future ASC certified Salmon farms will not apply any animal welfare standrads at all.
A standard backed by big WWF could make a change – and should, we feel. **We therefor remind you of our input to draft 1** and would like to underline the following:

1. Any certification scheme for aquaculture should address animal welfare as it is, together with ecology and sustainability issues, **the core concern.** Aquaculture is about rearing and treating animals first of all.

If you are really to set up a standard for responsible Salmon farming without addressing issues like ethology and «humane slaughter», you resp. the farmers who follow your standard will sure have to correct this in future – then certainly under pressure of consumers instead of proactively by your own will.
We again strongly advise you to search for experts in fish ethology and invite them to your dialogue. We would like to offer our help in making contacts to relevant persons.

2. Fish welfare is more than just health of the fish. Fish health is an outcome of fish welfare. Conversely, factors enhancing fish welfare do of course embrace fish health, but many other factors are responsible also, e. g.:
- species appropriate structure of the artificial habitat (allowing a variety of flow velocities, light/shadow, withdrawal of subdominant individuals, a.s.o.)
- species appropriate stocking density (which is a component of fish welfare and not to be discussed with regard to fish health solely)
- avoidance of rapid temperature changes, of noise and freightening
- minimum requirements for handling, transportation, stunning and killing
- minimum requirements for rearing practices (species engineering)
- a.s.o.

3. Lack of animal welfare in a fish farm is directly linked with a range of subsequent issues which, by the way, have economical consequences:
- increased disposition to disease and increased rates of medicamentous treatment
- increased inclination to (genetically) engineer the species in order to render the animals more «robust»
- increased tendency to escape from unappropriate living conditions
- increased mortality
- loss of flesh quality

It is hard to understand how a scheme fostered by WWF and other NGOs can just look away when it comes to the «leading characters» in aquaculture.

fish in : fish out ratio

SAD2, page 31

Criterion 4.2 Use of wild fish for feed

INDICATOR	***STANDARD***
4.2.1 Fishmeal Forage Fish Dependency Ratio (FFDRm) for grow-out (calculated using formulas in Appendix IV, subsection 1)	*<1.35*
4.2.2 Fish oil Forage Fish Dependency Ratio (FFDRo) for grow- out (calculated using formulas in Appendix IV, subsection 1) *OR* *Maximum amount of EPA and DHA from direct marine sources (calculated according to Appendix IV, subsection 2)*	*FFDRo <2.95* *or* *(EPA + DHA) < 30 g/kg feed*
4.2.3 Protein Retention Efficiency (PRE) for grow-out (calculated using formulas in Appendix IV, subsection 3)	*≥35%*

SAD2, page 32

Rationale
The Salmon aquaculture industry has significantly reduced the inclusion rates of fishmeal and fish oil from forage fish in Salmon feeds during the past two decades. The Forage Fish Dependency Ratios (FFDR) contained in these standards aim to support the trend toward lower inclusion rates and increasingly efficient use of marine resources, which are expected to continue. Fishmeal and fish oil are both finite resources that must be shared across a range of users with increasing demands, from direct human consumption to aquaculture to pig and poultry production. The SAD intends to promote the efficient use of these resources, producing increasing amounts of farmed Salmon from a given input of fishmeal and oil.

1. Generally, one would expect that an aquaculture standard fostered by WWF and other NGOs sets a top priority in reducing wild fish consumption for fish feed.

The reduction of use of forage fish is **not only an issue of stock preservation but also a major animal welfare concern.** Counted in individuals, the predominant majority of wild fish caught are destinated for the production of fishmeal and fish oil, mainly for feeding purposes in aquaculture.
The industrial fishing methods applied onto these stocks do not address the suffering of the animals in any way, neither during the catch by huge nets nor during the slaughter process. While wild fish in general are treated like a unconscious biomass, this is all the more true for the catch of forage fish.

We acknowlegde that predators like Salmons cannot (yet) be fed without any fish (which as a matter of fact is a much critized fact with most species farmed for the markets in Europe and Northern America. But the **development of a fully fishery independent aquculture** should be taken serious as a goal to be reached, and the definition of an overall reduction of the FIFO would enhance such development.

With regard to the forage fish still needed until then, it is of course crucial to define the stocks which can be sustainably used. Given the continuous and fast growth of the aquaculture industry, we feel the problem of sustainable sourcing is quite bigger that the pro domo solution presented by FTAD. **Why do you consider ISEAL and MSC as the only instruments to guarantuee appropriate catch?** Why not include forage fisheries already certified by Friend of he Sea in good quantities?

SAD2, page 33

Criterion 4.3 Source of marine raw materials

INDICATOR	***STANDARD***
4.3.1 Timeframe for all fishmeal and fish oil used in feed to come from fisheries certified under a scheme that is ISEAL accredited and has guidelines that specifically promote responsible environmental management of small pelagic fisheries promote responsible environmental management of small pelagic fisheries	*<5 years after the date of publication of the SAD standards*
4.3.2 Prior to achieving 4.3.1, the FishSource score for the fishery(ies) from which all marine raw material in feed is derived. (See Appendix IV, subsection 4 for explanation of FishSource scoring)	*All individual scores ≥6, and biomass score ≥8*
4.3.3 Prior to achieving 4.3.1, demonstration of chain of custody and traceability for fisheries products in feed through an ISEAL accredited or ISO 65 compliant certification scheme that also incorporates the FAO47	*Yes*
4.3.4 Feed containing fishmeal and/or fish oil originating from by-products48 or trimmings from IUU49 catch or from fish species which are categorized as vulnerable, endangered or critically endangered, according to the IUCN Red List of Threatened Species50	*Non*

SAD2, page 77

1. Forage Fish Dependency Ratio calculation

Feed Fish Dependency Ratio (FFDR) is the quantity of wild fish used per quantity of cultured fish produced. This measure can be weighted for fishmeal or fish oil, whichever component creates a larger burden of wild fish in feed. In the case of Salmon at current status, the fish oil usually will be the determining factor for the FFDR. The dependency on wild forage fish resources should be calculated for fishmeal and fish oil using the formulas provided below. In this standard, it is the highest number (i.e., dependency) that is relevant and which must be used. This formula calculates the dependency of a single site on wild forage fish resources, independent of any other farm.

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

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

Compared with draft 1, we do not see much improvement in draft 2.
We therefore remind you of our input to draft 1 and would like to underlien the following:

2. The formulas presented in the draft are too complicated in practice – and too permissive instead of reducing resolutely the FIFO to an absolute minimum.

3. We advocate a more determined and more pragmatical formula which clearly limits the use of forage wild fish to one-fifth of the farmed fish weight while making best use of fish by-products and waste fish, as defined in the fair-fish standard for aquaculture:

> 6.1 Feed components that originate from wild fish caught for feeding purpose may not exceed a fish in : fish out ratio (FIFO) of 0.2 : 1.0 on the farm in question, i. e. for the production of 1 kg farmed fish (harvest live weight) at the most 200 g of wild fish (live weight) may be fed.
> This FIFO does not embrace:
> - Fishmeal and fish oil which verifiably origin from by-products (trimmings) of processed farmed fish, but at the maximum the weight that can be produced out of the by-products provided by the farm in question.

- Fishmeal and fish oil which stem from the following sources but do not exceed a maximum of 30% of the total of fishmeal and fish oil employed by the farm in question:
    - by-products of fish (certified or not)
    - not marketable fish from certified sustainable fisheries
    - not marketable fish which had to be fished away by directive of the competent fishing authority in order to keep up the ecosystem's equilibrium

6.2 As far as available, the farm in question employs fishmeal and fish oil products approved by one of the following certification schemes: fair-fish, a bio-label, MSC or Friend of the Sea.

6.3 Fishmeal or fish oil it shall not originate from the species to be fed.

4. Such a formula can be managed by the feed producer and be controlled alongside with other criteria for fish feed.

In practice, for Salmon farming this would mean a farm could employ fishmeal up to the following amount per kg of farmed fish (harvest live weight):
- 22,2% of 200 g wild fish = 44.4 g fish meal
- 22,2% of 30% per kg of farmed fish (harvest live weight)= 66.6 g fishmeal (supposed the by-products represent 30% of the harvest live weight and are recycled to fishmeal)
- 47.6 g (30% of the total of fish meal employed by the farm)

Thus up to 158.6 g fish meal per kg farmed fish (harvest live weight) would be tolerated even under the strict fair-fish approach. This satisfies about 50% to 75% of what is usually employed today. It should not be so difficult to drive the Salmon industry there, should it?
Similar calculation has to be made with fish oil of course.

5. Any foresighted Salmon farmer who claims to produce sustainable and to present an alternative to the depletion of fish stocks **should aim at phasing out his fishmeal and fish oil input** according to such calculation (and even to zero) before public pressure urges him to do so overnight.

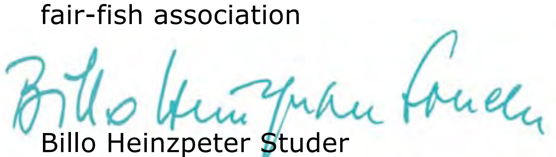
Conclusion

We take the efforts made by FTAD participants for serious, and we are far from polemics about the results as the task is not so easy.
Nevertheless we feel that responsible Salmon farming should yield a good answer to the two questions discussed above. With the criteria presented in draft 2, ASC would just bring in more of the same. This is not the answer concerned consumers are expecting – and consequently it is not a standard concerned farmers could relay upon for long. When will they have to reinvest next time to cope with demand?

Thank you very much for taking our input into account.

Kind regards

fair-fish association



Billo Heinzpeter Studer
Director

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: August 3, 2010 to October 3, 2010

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT October 3, 2010.

*Name: Ian Michie
*Organization/Company: Findus Group
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2	2.5.1	In the UK the farmer is obliged under the law to care for the welfare of his/her stock, including protection from predation. Effective ADD's may at times be needed by the farmer to help meet this obligation. Stress to the stock can be significant when predatory mammals such as seals are actively probing barriers even when they cannot attack, and ADD's can discourage this behaviour. It is an offence also under the Conservation Regulations 1994 to deliberately disturb cetaceans in the EC and so ADD's should only be deployed where cetaceans are not adversely affected. We would not encourage the adoption of standards which may have a negative result on welfare by prohibiting ADD's completely, particularly when there is no	It is uncommon for ADD's to be needed continuously. We would suggest that their deployment could be limited to 90 days split between the phases of most common seal activity before whelping and at weaning. It should also be incumbent on the farmer to demonstrate that the ADD being deployed does not have any wider consequences for wildlife, particularly cetaceans.

		proven consequence for wildlife in the farm vicinity.	
	2.5.4 - 2.5.7	These indicators are all addressed by law through the Marine (Scotland) Act 2010. Under the protection of seals part of the act a license is issued which allows a farm to lethally dispatch seals up to a maximum permitted number. The number of animals is calculated as a proportion of the "Permitted Biological Removal", which is the number of animals that may be lost to a population without affecting population success (on advice from the statutory consultative body the Sea Mammal Research Unit). The number of animals in a farm license is always a proportion of the PBR and so is precautionary.	These points should be easily evidenced in the UK as they are required by law. The number of lethal incidents for marine mammals (seals) should be at or below the number in the farm specific license. Any other marine mammal should be zero, and lethal incidents for other species could be left as in criteria 2.5.5
Principle 3	3.1.6	There is a concern that where populations of wild salmonids (Salmo salar and Salmo trutta) are very fragile, interference, through capture for monitoring for sea lice, could have a negative effect on survival.	This requirement should not be an absolute but should be based on advice from the Fisheries' Management responsible for the relevant salmonid populations in the ABM.
	3.1.7		Given the above, it should be option A
Principle 4	4.2.1 – 4.2.3	The primary use for all captured fish should be for direct human consumption wherever possible. Where sustainable catches are in excess of the market demand for human food, especially for small, bony species, the secondary use of these catches should be for the feeding of farmed fish designated for human food. Given relative efficiencies this should be in preference to feeding marine materials to terrestrial animals such as pigs and poultry. We do not accept the principle that the SAD should incentivise the reduction or set limits on the inclusion of wild captured marine materials in farmed fish feeds. The important issue is that the	The forage fisheries, for low trophic level species, should be subject to ecosystem based fisheries management regimes certified by credible bodies such as the MSC. While EBFM models for low trophic level species are being accredited, and in the interim 5 year period for certification as set in indicator 4.3.1 there should be a "discount" ratio, perhaps 50%, for materials derived from MSC certified fisheries to offset against the FFDR's. Marine materials from certified EBFM fisheries should ultimately be excluded from the FFDR or n-3 calculations in a similar way to by-products and trimmings.

		marine material should be from demonstrably sustainable fisheries.	
	4.3.1	ISEAL may not be the only credible accreditation body in this area.	As in indicator 4.3.3 the requirement should be that the fisheries are certified through an ISEAL accredited scheme or ISO65 compliant scheme that also incorporates the FAO Code of Conduct for Responsible Fisheries.
Principle 5			
Principle 6			
Principle 7			
General comments			

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3			
Principle 4			
Principle 5			
Principle 6			
Principle 7	8.24 – 8.27	In Scotland open net pen production of smolts has been the norm during the 30 plus	The 5 year allowance in 8.25 should be extended to 8.24 for water bodies with

		years of the sector. Currently over 50% of smolts are still produced by this method. There is little evidence of damage or reduction to wild salmonid populations in adjacent water bodies in that time. Annual water quality and benthic monitoring is conducted as required by law and trophic conditions have not significantly changed over time. In fact research in some areas is leading to increases in the production permitted by the regulatory authorities. There is very little disease prevalence in freshwater. In terms of potential for precocious parr release, even where there have been escape episodes, the trend for breeding in salmon farming has been for late maturing stock and so precocious parr development is typically very low now, perhaps 0.1%. The multi stakeholder containment group in Scotland will soon produce a code of practice and technical standards that will be underpinned by legislation to make the low level of escapes in freshwater even rarer. Moving production to land based closed containment systems would be contrary to principle 4 in terms of energy use and GHG emissions. In summary, to immediately exclude all open net pen production in Scotland, where most water bodies have salmonid populations, would not necessarily materially promote the objective of protecting wild salmonid populations or sensitive freshwater ecosystems.	salmonid populations. This time period should be used to conduct further research into the impacts of open net pen production in freshwater in order to inform and justify indicator 8.27 on assimilative capacity and neutrality of effect. The implications in terms of energy demand and GHG emissions, land and water use, employment, animal welfare (stocking densities) and cost of moving volume into closed systems should also be considered. Escape episodes should remain at zero. The loss of ASC certification would have substantial impact on smolt supply for ASC seawater farms and therefore add even further incentive to preventative measures against breaches of containment.
General comments	The steering committee should be congratulated on their work. It is obviously very difficult to balance the demands of different interests and still produce a credible set of standards for maintaining a positive direction of travel for aquaculture globally. We support the WWF initiative and commend the efforts that have gone into developing the		

	standards. Our concern as a major Seafood Processor in Europe is that there appears to have been insufficient consideration given to the status of the UK salmon farming sector, which is highly regulated and mature. We are concerned that, while we would be keen to see significant interest in certification, there may be understandably some reluctance in Scotland to engage with the standards over issues such as open net pen production for smolts.

Katherine Bostick
Coordinator
Salmon Aquaculture Dialogue
World Wildlife Federation
By e-mail: Katherine.bostick@wwfus.org

June 14, 2011

Dear Katherine:

Let me start by congratulating you and your World Wildlife Fund (WWF) Aquaculture Dialogue colleagues for the effort you have put into the seven-year process of developing standards for the aquaculture sector. You and the many stakeholders who have contributed to the Dialogues have invested significant time and resources into this process.

As stakeholders, Fisheries and Oceans Canada representatives have contributed to technical reports, attended Dialogue meetings and workshops, and provided extensive comments on numerous drafts of WWF bivalve, trout and salmon standards. We have also served to coordinate related activities within the Canadian aquaculture sector.

It is based on this stakeholder involvement that we provide these comments on the May 2011 document entitled “Second draft standards for responsible salmon aquaculture.” We understand that this is the also the final draft, before the Salmon Aquaculture Dialogue (SAD) Steering Committee finalizes the standard and passes it to the Aquaculture Stewardship Council (ASC) later this year.

As you know, we have not always agreed with WWF on either the elements of the standards or the process which has excluded government management and regulating bodies from participating directly on the SAD Steering Committee. While we have done our best to contribute through other channels – submitting 13 pages of comments that were the result of careful review of the first draft by Canadian scientists, managers and regulators – we find that our input has not generally been taken into account. In this regard, please note that we request that the comments we already submitted on the first draft be brought forward to the SAD Steering Committee at this time.

In addition to the comments we provided on the first draft that were not taken into account, we have the following comments on the second draft:

- Should the salmon standards be finalized with the content given in the May 2011 second draft, one possible outcome would be the creation of situations that would force potential users to choose between following legal requirements (as prescribed in Principle 1) and these certification standards (particularly in Principles 3 and 5). The effort we put into writing detailed comments on the first draft was intended not to justify our regulatory regime but to provide additional scientific expertise to the deliberations of the Steering Committee since we found that many of the criteria were based on assumptions created from an anti-aquaculture bias rather than scientific fact.

Canada

- Ironically, in the very few places where it appears that our recommendations have been considered, the net effect has been to add even more compliance requirements that are not scientifically supported. While there appears to be an acknowledgement that there exist natural deviations from the assumptions made for criteria (particularly in Principles 2, 3 and 5), farmers would have to meet even more onerous requirements if they were to apply for a deviation from the assumption. This highlights what is potentially a significant weakness in the standards while at the same time appearing to punish the grower for those same weaknesses.

- We are particularly concerned that our advice on sea lice (Principles 3 and 5) has been disregarded. Sea-lice counting frequencies should be based on science not guess-work. Dr. Crawford Revie at the Atlantic Veterinary College (AVC), University of Prince Edward Island, is currently leading the development of an ISO standard for counting sea lice. The WWF should consult with Dr. Revie before finalizing the standard in order to have current information. In addition, we are concerned that the requirement of the standard to treat fish with therapeutants for low sea-lice loads that are not causing health problems for fish (wild or farmed), may encourage a hastening of parasite therapeutant resistance. Clearly this is not good practice of fish health management, and does not have a basis in science. Moreover, Principle 3 requires monitoring of sea-lice levels on wild salmon. This requirement puts the standard squarely at odds with Canada's *Species At Risk Act* under which some populations of wild Atlantic salmon are listed as endangered.

- Principle 5 of the draft standard also continues to be problematic. It does not, for example, differentiate between the use of chemicals or products used on an aquaculture site from the use of the same chemicals by other industries. The same applies to the use of antimicrobials in the environment that can originate from human use. Human use greatly and significantly exceeds use by aquaculture. The standard should include a process for establishing baselines for products originating in the environment from other anthropogenic sources.

- Both erythromycin and oxytetracycline are listed as "critically important" by the World Health Organization, but the aquaculture industry has a limited selection of antimicrobials available for use as approved by governments. In addition, government approvals for drugs and bath treatments include detail on how much should be administered. The farmer must adhere to government requirements; therefore, as presented, the standard is one to which it appears to be impossible to conform.

- There is also the possibility that the approach described in the draft standard will potentially reduce the ability to reach an effective target dose, and zones of influence should be recognised. Guidance should be provided in the standards as to what products may be used or how diseases, formerly treated with "critically important" antimicrobials, should be controlled. In this area, we feel that the standards are seriously impinging on the expertise of aquatic animal health veterinarians.

Looking ahead to the development of the audit guidance document, we expect that these and all other comments that have been submitted over the course of the public review periods will be made available to whichever independent organization is chosen to develop the guidance document. We expect that the preparation of this document will result in an independent review of the feasibility of these standards which may occasion additional changes.

Our objective in working with the WWF Dialogue process was to work towards scientifically defensible standards that would drive improvements in the global salmon-farming industry, but which were also compliant with national, provincial, and territorial laws and regulations, as well as with international norms such as those developed by the FAO and ISEAL. Fisheries and Oceans Canada has made significant contributions towards having standards that meet these requirements as we believed our objectives were consistent with those of the WWF and the SAD. While the May 2011 document does not appear to have met these expectations, we look forward to reviewing the final standard in anticipation that further revisions will address these important concerns.

At the end of the day, however, farmers, buyers and consumers have choice in the sustainability standards marketplace and that is another important facet of the current environment. It will be very interesting to see what level of acceptance these standards enjoy as they come into being through the ASC.

Very best regards,

James Smith, Ph.D.
Director
Certification and Sustainability Reporting
Aquaculture Management Directorate
Fisheries and Oceans Canada

FishWise Comments on the Salmon Aquaculture Dialogue Draft Standards

June 14th 2011
Dr. Siân Morgan

Summary

FishWise is grateful for the opportunity to submit comments to the Salmon Aquaculture Dialogue's (SAD) draft for Final Public Comment (June 14th, 2011). We applaud the substantive work that has gone into addressing the first round of public comments to strengthen these global standards and hope that our additional contribution proves useful in improving the final version.

General Comments[1]

Process/guidance – The choice of the GSC to move forward with a 30 day public comment period in a five year process is disappointing and has proven challenging in terms of allowing intra-sectoral discussions, inter-sectoral discussions and honest assessment of the standards.

Furthermore, the absence of a guidance document for public comment is a serious impediment to understanding the substance and legitimacy of the standard. Methods are critical to implementation, particularly in a performance-based standard. We question whether public comments on a standards without a guidance document jeopardizes the ISEAL process and regardless, request that there be a final opportunity to comment on the standard/guidance package when this is complete. We would only support approval of the standard as a whole if guidance has been allowed both stakeholder input and final GSC sign-off. We think it is reasonable to lay out, in advance of the development of the guidance document, the timeline for this process and for all parties to make a prior commitment to abide by this timeline.

Objections/stakeholder input - Will there be an objections process for proposed certification that allows stakeholders (e.g. indigenous land holders) to interact with certification? This is a critical process point and is material to how stakeholders interact with the current public comment process.

Best Practice - The standards remain heavily oriented towards open net-cage production and should be strengthened by adding specific standards in systems with wild salmon runs or significant risks associated to wild biota, to encourage closed containment aquaculture. At a minimum closed containment systems should be explicitly excluded from auditing costs associated with a number of the least relevant standards (see AgriMarine's comments). Conversely, additional standards for closed containment

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[1] FishWise recognizes that some comments made here are most relevant to the ASC, and we trust the SAD GSC will convey these accordingly.

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systems may be needed and should be added to the standard. Best practice should also be aligned with the recommendations of groups such as government Special Task Forces or Special Committees.

We remind the steering committee, that in British Columbia Canada for instance, such a neutral taskforce, (the Special Committee on Sustainable Aquaculture) after receiving 814 written submissions and testimony from more than 80 expert witnesses, reported that the use of closed containment does “not (represent) lofty goals but practical applications to ensure the health of our wild salmon populations and marine ecosystems, while allowing for continued growth and development of the aquaculture industry.”[2] We also point out that such processes, while geographically constrained, still offer more substantive consultation and feedback than has been undertaken in the Salmon Aquaculture Dialogue to date, globally. To dismiss such recommendations would be imprudent as well as counter to the open and inclusive nature of the Dialogues.

FishWise understands that the standards intentionally target the top 20% of producers in a pragmatic attempt to move the majority of producers towards better practice. However, certifying the top 20% of current producers (the vast majority of whom will use open ocean net cages) also has the potential to obstruct the financial emergence of closed recirculation systems at scale. Recirculation technologically has the potential to fundamentally redefine the magnitude of impacts associated with salmon farming and should be a core industry aim.

To this end, we strongly encourage the steering committee to enter into dialogue with the ASC to formulate a plan that uses ASC certification to meaningfully support research that improves economic access for closed containment farms. Such a proposal could, for example, include a commitment by ASC to redirect some percentage of logo and licensing fees for salmon towards R&D or innovative approaches to restructure taxes or perverse subsidies. In this way, ASC would be simultaneously acting to reform the existing net cage industry, while also transitioning technological thresholds towards systems that are fundamentally best practice in terms of the key objectives of the Aquaculture Dialogue process. The core elements of this plan and a commitment from the ASC to support such a plan should be included in binding continuous improvement sections of the standards. We see such commitments as parallel access issues to those underlying ASC’s commitment to build capacity for small-scale producers/developing country producers to attain certification.

Scope (Footnote 79) – Footnote 79 raises significant issues in terms of both traceability and scale of certification, calling into question whether farms must be compliant at the site scale for all standards, or whether certain standards can have sub-farm level certification.

[2] http://www.leg.bc.ca/cmt/38thparl/session-3/aquaculture/index.htm

Introduction - Context and some key financing issues are missing from the introduction in ways that could impede transparency related to process. Please see specific comments.

Continuous Improvement – We are concerned that continuous improvement pieces will be lost from the standards because they are currently sitting in Additional Information sections which will be excised. Additional Information with future recommendations should remain in the standard (or in an Appendix or other location where it remains binding), when other types of additional information are excised.

Land rights and indigenous peoples (Principle 1) – The process for addressing debates over land claims or land tenure is not clear. We suggest that discussion with MSC over comparable issues may be useful.

Area-based management planning (3.1.1.) – FishWise is highly supportive of including area-based management in the standards to manage disease and escapement issues for wild salmon health. However, to deal with wild/farmed salmon interactions it will be necessary to understand more fully the quality of the proposed data collection and whether it has the power to detect the impacts in question. The information should be made available via the guidance document for public comment as it has material relevance to the efficacy of the standard.

FishWise also asks that the methods used to collect wild salmon data and their use be made explicit. Sampling of wild salmon in some populations will be challenging, or could be deleterious and therefore should be carefully considered where stocks or runs are already at risk. These methods should be articulated in the guidance for public comment.

Benthic Impacts (2.1) – We are generally supportive of the approach and recognize that there is peer-reviewed science that supports the proposed indicator package. We question whether a Before-After-Control-Impact (BACI) approach might not be a more effective means to monitor and detect impacts. BACI assessments are also well suited to the current sampling design laid out in Appendix II. Philosophically, the standards' priority issue should be to assure a lack of impact on baseline conditions (standards that define acceptable levels of change in benthic communities), rather than to assure high diversity scores in benthic environments (which is the orientation of the current approach).

The accuracy of an AZE is currently limited by either a) assuming a set area or b) relying on models which are limited in complex bottom environments. In the interests of genuinely addressing impacts, we urge the steering committee to commit to more robust methods such as food tracers with the ability to detect the true farm footprint. Where costs/time resources are prohibitive, such work could be undertaken as academic/industry or government/industry collaborative research. Under the ABM, a first step may be to use all methods on a subset of farms in a region in order to cross check differences in the efficacy of approaches against one another, in order to optimize the most robust and cost effective method for the next iteration of the standards.

We note that without guidance, it is not possible to evaluate whether proposed sampling methods will be equally appropriate for the diversity of benthic classes found in different geographies.

Viral disease and other pathogens (Principles 3 & 5) – Issues outside of sea lice are given limited and insufficient attention in the standard. There are serious concerns around viral diseases, and little knowledge of consequences to populations of related or unrelated marine organisms. For example, RNA viruses fall into at least seven families (Birnaviridae, Paramyxoviridae, Picornaviridae, Orthomyxoviridae, Reoviridae (Reovirus and Rotavirus), Retroviridae, Rhabdoviridae, and Togaviridaem), while DNA viruses fall into at least three families (Adenoviridae, Herpesviridae and Iridoviridae). Furthermore, there are a multitude of poorly known/emerging salmonids diseases (e.g. Salmonid Picornalike Viruses, Landlocked Salmon Virus (LSV), Atlantic Salmon Rotavirus (ASR), Trout Strawberry Disease (TSD), Coho Salmon Tumor Virus (CSTV), Epizootic Epitheliotropic Disease of Lake Trout, Epizootic Hematopoietic Necrosis (EHN) of Trout, Erythrocytic Inclusion Body Syndrome (EIBS), Intraerythrocytic Viruslike Particles different from EIBS in Atlantic Salmon, and Third Erythrocytic Virus associated with anemia. Most of these viral disease have poorly understood transmission/virulence/ecology. Further attention/rationale is needed to demonstrate how the standards intend, in a risk-based manner, to address potential amplification and transmission of these pathogens. The burden of proof in such processes should fall to the industry (all members of the supply line), as recipients of private profit from the use of common ocean resources.

Responsible Capture Fishery Inputs (4.3) - We strongly encourage the steering committee to consider raising the bar on FishSource Scores 2 and 3 which pertain to use of scientific advise (Score 2) and fishers adhering to quotas (Score 3). We are not supportive of setting the bar at 6 on Scores 2 and 3, which equates to quotas set 25% above scientific advice and harvested 25% above quota – particularly for low trophic level fisheries that support ocean food webs. We ask the steering committee to consider a) that Scores 1,2 and 3 will have the greatest influence over future stock health because they govern management practices, b) use of FS scores or any of the proposed interim approaches are predicated on single-species stock assessment which are usually insufficiently conservative to account for collateral ecosystem needs, and c) that low scores have additive effects – e.g. a fishery that is both set over quota and then harvested over quota is doubly hard hit by low performance thresholds. Please see more extensive comments below.

Energy (4.6) - FishWise commends the inclusion of standards that ask for accounting of GHG emissions that track farm emissions and particularly feed emissions. We hope that this issue will be shared across dialogues, particularly where fuel-intensive fisheries are used for FM/FO inputs. We recommend making explicit whether additional energy standards will/won't be needed for RAS and including any associated rationale.

Copper pollution (4.7) – Copper is a heavy metal with the potential to induce lethal and sub-lethal deleterious effects at low concentrations. For species such as lobster, levels down to 0.5 mg/L have been problematic, while in other keystone species such as spiral wrack, anatomical abnormalities that interfere with cell division and zygote development have been observed at levels as low as 10.6 nM. The proposed threshold levels of 35 mg/L are approaching two orders of magnitude in excess of these levels. It is not clear that sufficient consideration has been given to setting standards that promote the use of existing alternative technologies such as traditional land-based power washing or double net bags that have the potential to greatly minimize or even eliminate copper pollution, which is most consistent with best practice.

Parasiticide Use (5.2.5) – The current levels of parasiticides allowed by the standard, and the fact that this allows all animals to be triple dosed and reach certification is excessive. Densities that require this type of disease control are not examples of sustainable production (which by definition should not need major outside controls to maintain stable production). Closed bath systems are possible and represent best practice that should be promoted by the standard.

The proposed PTI index does not have a direct relationship to the intent of the standard, which is given as minimizing the total parasiticide load into the surrounding environment. The use of closed bath treatments would make this standard irrelevant, provided appropriate disposal of the parasiticide were accounted for.

If the steering committee does not invoke the suggested closed bath treatments, this standard still needs heavy modification in a way that addresses, at a minimum, active ingredient load per unit production, cumulative area loading, presence of susceptible organisms in the area, and potential parasiticide impacts on those organisms. Relevant elements should be assessed in the EIA and become binding in the standard.

Data tracking and transparency (Appendix VI) - FishWise commends the steering committee's commitment to data tracking and transparency as outlined in Appendix VI. We see this commitment as progressive, informative and a tool that will allow ENGOs such as FishWise to both demonstrate the performance of certified farms and potentially promote their market access to partnering retailers. This approach will also be crucial for general accountability of the label.

<u>**Issues of Consistency**</u>

Species eligible for certification (Introduction) - It would be logical to build consistency around the relative elasticity of standards to accommodate species outside the focal targets of certification. For example, the ShAD will certify species other than the focal targets of the standards if they can meet the most stringent requirements of the standards, whereas it is not clear/is not(?) the case for the SAD. This will create confusion and frustration amongst producers if not treated in a fair and consistent manner.

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Scale of certification - Discussion between the ASC, the TAG and steering committees is needed prior to final release of standards to align whether certification (as well as traceability and auditing) will operate at a farm level or at a cage/pond/sub-farm level.

Biodiversity Assessment (2.4.1) – Methods for EIA should be aligned partially or fully with the EIA process outlined in the ShAD. Where differences exist, a clear rationale for discrepancies should be given.

Energy (4.6) - FishWise is highly supportive of tracking GHG emissions around feed inputs. We suggest that this is an issue that would build core consistency and label credibility if harmonized across the dialogues. Therefore this is a topic for early discussion by the TAG and should remain a priority consideration if feed issues move into any lateral roundtable process.

Responsible Capture Fishery Inputs (4.3) – There is the obvious need to build alignment around the responsible sourcing and traceability policies associated with raw material for feed. We trust that the steering committee is deeply familiar with this issue and will attempt to build consensus around feed standards with other dialogues and particularly the ShAD (as the other high value/volume commodity species with standards still to be finalized), rather than acting in isolation as a singular commodity.

Data tracking and transparency (Appendix VI) – The implementation of data tracking and transparency via public release of information outlined in Appendix VI is functionally contingent on the agreement of the ASC to build an online database and for such a tool to be functional prior to use of the standards. Therefore, it will be necessary for ASC to publicly support this endeavor and to create a workplan towards mounting such a database on an appropriate timeline that is accepted by the steering committee and other stakeholders who will ultimately be promoting the use of these standards to retail partners.

For monitoring and evaluation purposes (which will be required by the label to reach compliance with ISEAL's Code of Conduct), it would help ASC to use the data collection requested by the SAD standards as a foundation on which to build an online database capable of storing comparable data inputs from all ASC standards' users (for tilapia, *Pangasius*, trout etc.).

This issue should be discussed by the TAG so that ASC staff have appropriate guidance when building such a database to assure that it has the capacity to warehouse relevant data from different standards (either now or in the future). Furthermore, this issue will require TAG representatives to build agreement amongst their constituent steering committees within the Aquaculture Dialogues. The sooner such data start to be acquired for all species, the more robust the capacity to measure impacts of the label and to assure quality baseline information.

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Continuous Improvement - It is critical for stakeholders to know how frequently the standards will be revised in order to steward resources for engagement appropriately. The intended periodicity of improvements is also a core accountability issue and is relevant to the buy-in of stakeholders. This intent should be communicated to steering committees by the ASC/TAG, and included in public comment periods, as they are material to the pace at which impacts can be addressed, and therefore whether certain stakeholders will/won't accept the current version of standards.

Social Standards (Principles 6&7) - It is unclear and difficult to justify why the wellbeing of workers on farms or communities surrounding farms should differ among Dialogue standards. We suggest that the steering committee consider benchmarking existing standards in these Principles against at least the major commodity species, and then craft an explicit rationale where there are differences between the SAD and other species. FishWise also supports the suggestions for revisions submitted by Oxfam Novib.

Smolt standards – We suggest the SAD work closely with the FTAD to assure compatibility around the intent and content of smolt standards for salmonids. As per social standards, an explicit rationale should be crafted where there are differences between the two standards.

Specific Comments

Introduction

There is no comment in the introduction about either the objective of setting the bar to certify the top 20% of global producers, how the theory of change is expected to operate, nor whether/how continuous improvement of the standards will function. These are all core concepts that were explained to participating stakeholders in public dialogue meetings and are foundational assumptions that participants accepted. We believe these should be stated explicitly and there should be a declared accountability to these precepts.

Range of Activities within Aquaculture to Which the Standards Apply

"… involves the planning, development and operation of facilities, which in turn affect the inputs, production, processing and chain-of-custody components…."

Could include expansion as well.

This wording is ambiguous and does not explain the mechanism of change or how the theory of change works. How and why there are/aren't standards around feed inputs would helpful, transparent, and give representation to the careful decision-making that will have occurred within the GSC on these issues.

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Biological and Geographic Scope to Which the Standards Apply

FishWise believes it would be helpful to articulate how other salmonids will/won't be covered under other standards. For example, the fact that there is a freshwater trout aquaculture dialogue that also covers *Oncorhynchus* could be confusing.

In addition, it would be helpful to articulate how other species that fall into the same "Salmon" market niche as *Oncorhynchus* and *Salmo* spp. will or won't be eligible for certification if they can meet all standards (e.g. *Salvelinus* spp.)

A statement is needed to make explicit if standards apply only to *Oncorhynchus* and *Salmo* spp. cultured in saltwater. There is a statement to this effect at the top of p. 11. The way the scope is currently introduced, it would seem that these species grown in any conditions/systems would be eligible for certification.

Standards Setting Process

The "pay-to-play" aspect of the SAD steering committee is not recorded in the explanation of the SAD process. This approach is a relevant part of the process and should be included as part of the commitment to openness and transparency. Similarly, how budgeting decisions were made and the presence of the Resource Legacy Fund funding for ENGO participation should also be included.

The following additional points should also be considered:

- The super majority aspect of voting should be covered.
- Facilitation and the names of facilitation organization and Dialogue coordinator should be included.
- Would recommend bulleting this section for readability. As presently drafted, it does not read easily in prose.
- A summary of public meetings and SC meetings in tabular format showing stakeholder attendance numbers would also be useful (see the ShAD standards).
- Names of past steering committee members should also be included (e.g. transitions at Pew).

Continuous Improvement of the SAD Standards

FishWise would appreciate seeing a statement to indicate that performance thresholds will always be altered in the direction of lessening impacts.

Information for the reader

It may be worth making explicit to the reader how the guidance check-list and guidance document do or don't differ in their relative "bindingness". [From comments Rochelle has made on the ShAD standards, it appears that guidance text is non-binding.] This has important implications in terms of readers' expectations and what people may want to see made more explicit in standards versus in guidance.

Box

This information could be moved up to the front of the introduction where it would act as broad, relevant context.

Preamble

We suggesting moving novel content into the introduction and removing repetitive content already covered in the scope and continuous improvement sections. Note that periodicity of continuous improvement is made explicit here, but not in the relevant section above.

<u>Principle 1. Comply With All Applicable National Laws and Local Regulations</u>

1.1.5 Under Additional Information, the intent explained is not fully encompassed in the wording of the standard for 1.1.5. which specifies only theraputants. Import laws may pertain to much more than only theraputants (e.g. certificates of catch location, catch method etc.). This mismatch in intent should be resolved.

In the paragraph about concerns re: the equivalent status of legal requirements, it would be worth emphasizing that this Principle is about legal responsibility and that subsequent Principles and standards build bars above these minima. This Principle is encompassed by the common concept of "necessary but not sufficient". National disparities in legislation are not strongly relevant - they represent different starting places - but the standards create a common end point in performance.

<u>Principle 2 – Conserve Natural Habitat, Local Biodiversity and Ecosystem Function</u>

Standards 2.1.1. – 2.1.4. and Appendix I Methods

2.1.1-2.1.2.

The following points need further definition:

- Do AZEs begin at the edge of an array? Not currently explicit.
- Residual current direction needs definition.
- Can both stations from the cage edge be at the same end of the farm?

- The long distance reference site should be downstream of the residual current direction.

- No description is given of the faunal grab sampling which is needed to evaluate the capacity of the method.

2.1.2. It is not currently possible for stakeholders to easily evaluate the suggested AMBI thresholds given that the method uses paid software.

2.1.2. It will be necessary to include calculations for the Shannon-Wiener Index, the Benthic Quality Index score and the Infaunal Trophic Index score in Appendix I.

2.1.2. AMBI has not been shown to be useful in naturally stressed and species poor communities (e.g. high hydrodynamic energy areas, subtidal sandbanks, and the inner parts of estuaries) (Mexika *et al,* 2005. *Ecological Indicators* 5: 19-31). Could salmon farming occur in any of these environments? If not, state this explicitly.

2.1.3. It will be necessary to define "pollution indicator species". The need for this indicator is not currently clear. We suggest removing it or giving further, scientifically referenced, rationale that includes an explanation of the synergistic intent of 2.1.3 in combination with 2.1.2.

The design and methods used here are suitable for Before-After-Control-Impact assessment, yet there is no obligation to look at changes in sample composition through time in the standards. This approach would be a clearer indicator of farm impacts than static faunal index values that essentially set performance for biodiversity. Ground-truthed change against baseline values are the most justifiable way of measuring the presence/absence of impacts. This type of relative approach would also avoid penalizing farms sited in areas of low levels of baseline benthic diversity.

The ABM plan should include components that accounts for the cumulative impacts of nutrient loading and smolt production within the defined area. Other sections to include in the ABM plan are noted elsewhere in comments.

2.2 Water quality in and near the site of operation

2.2.1 - 2.2.2. Oxygen availability is directly tied to fish health and is also an indirect measure of density/crowding. Both of these factors relate to fish condition and risk of disease amplification/transmission. Therefore we suggest that the steering committee consider increasing the current oxygen saturation/concentration standards to levels > 60% DO or 5mg/L. A back-of-the-envelope calculation by WWF estimates that at 60% saturation, in seawater with a salinity of 30 ppt, DO falls below 5 mg/L at temperatures higher than 15 degrees Celsius. Furthermore, if this standard relies on a paper monitoring record, it will be challenging to audit accurately. We recommend instead that a tamperproof monitoring method such as data loggers or a comparable alternative should be used.

2.3 Nutrient release from production – Appendix I

It is not clear to us whether sampling of fines will be undertaken by an auditor, or record-checked by an auditor. [Sampling stage 3 gives 6kg as mass of pooled sample – shouldn't it be 3 kg?]

2.4 Interaction with critical or sensitive habitats and species

2.4.1. FishWise is philosophically supportive of this standard, but believes that in practice it will need to have significantly more guidance associated with it before its utility can be ascertained. The biodiversity assessment should also consider disease risks and heavy metal (copper) pollution issues among others. We have made these suggestions where relevant in comments on specific standards.

2.4.2. If there is interest in using HCVA methods, then the SAD standards should stipulate a process that invokes stakeholders to define HCVAs via the ABM, EIA or some other similar mechanism. Otherwise, we suggest that mention of HCVAs be removed because their mention implies feasibility, while HCVAs do not exist at any meaningful number of locations in marine environments. The HCVA network currently has no tools for stakeholders to implement HCVA processes for marine systems.

Footnote 20 – If already sited in an area where protection is being established, then farms should need to demonstrate compliance *to the relevant management authority*. As currently drafted, it is not clear who verifies any demonstrations made by the farm.

Auditing Guidance

It is not clear to us that compatibility with all goals of protected areas are covered through the EIA assessment of 2.4.1, as described in Appendix I, Section 3. The stated focus encompasses only species at risk, vulnerable life stages, important biodiversity areas and species of high economic impact. The EIA appendix in the ShAD may provide additional considerations usually encompassed in EIAs.

2.5 Interaction with wildlife, including predators

2.5.6. What is the rationale for 9 predators and 2 marine mammals? We believe this would be helpful to articulate. We also believe that the standards should explicitly preclude the future siting of farms where there is a high risk of predator-farm interactions.

We suggest that farms that have exercised culling as potential partners in ADD/AHD experiments. E.g. Any farms that have >50% of their mandated maximum culls could be obligated to participate as experimental sites for active ADD experimental work. In this way, losses of marine mammals may be offset by future increases in the efficiency of ADDs.

<u>Principle 3 – Protect the Health and Genetic Integrity of Wild Populations</u>

3.1 – Introduced or amplified parasites and pathogens and Appendix II

3.1.1. – 3.1.8. FishWise is supportive of the plan to stipulate the existence of an ABM in the standards to manage disease and escapement issues for wild salmon health. The SAD steering committee should be commended for its leadership on this issue. The proposed component of this plan represents a true step forward in trying to address cumulative and ecosystem impacts of farms in a region. In addition, the SAD is currently the only dialogue that has taken a serious, spatially explicit approach to addressing the impacts of the industry in a landscape. Existing science suggests that disease management cannot be adequately addressed without considering relevant issues that include data collection, knowledge of the timing of runs, proximity of farms to wild fish and issues of density and exposure time.

Before FishWise issues its full support for 3.1.1 – 3.1.8, it will be necessary to understand the intensity and quality of the proposed data collection and whether it has the power to detect the impacts in question. The information should be made available for public comment as it has material relevance to the quality of the standard

3.1.1. Appendix II - ABM plans should also account for the findings of EIAs from 2.4.1. (location critical habitat for species at risk, how to maintain connectivity for species at risk etc.) and how future siting considerations minimize interactions with predator populations (e.g. seal colonies, haul outs etc). It will also be important to estimate cumulative nutrient inputs from farms in a region and whether the timing of such nutrient inputs can be spatially or temporally managed to minimize impacts, while respecting farm wellbeing and fish nutrition.

The ABM plan should have an explicit component on non-lice disease and pathogens (e.g. viral disease)

We suggest that it will need to be clearer whether an ABM plan is necessary regardless of whether there are interactions with wild salmonids within 75 km. FishWise is supportive of ABM plans regardless of the presence of wild salmonids, as farms have other cumulative effects that can only be addressed in a coordinated fashion.

3.1.7. Option B, while slightly less precautionary in terms of sea lice infection potential, is more precautionary in terms of resistance issues and also necessitates close monitoring of the status of wild populations, which will be important and informative. Is there a way of estimating overall condition of fish when they are being monitored for lice to see if some set of condition factors can be used to predict disease vulnerability based on sea lice density on farmed fish? Have there been attempts at pragmatic methods to generate crude estimates of duration of exposure to elevated lice levels? Understanding how condition/chronic exposure relate to disease transmission is essential and will likely require some degree of trial and error in real systems. In the absence of sufficient data to set thresholds, a pragmatic alternative could be to use the ShAD standards and certified farms as systems for adaptive management. This would mean deliberately asking different areas to undertake different management procedures as part of their commitment to 3.1.2. Large scale manipulative work has the ability to tease apart how different factors influence transmission between farms and wild stocks. In the absence of better information, this may be an informative and collaborative way forward.

If Option B was adopted, it would make sense to adopt networked monitoring. In this way, upstream farms would ascertain wild fish condition and inform their downstream neighbors, giving downstream farms time to adapt management as needed.

The consequences of mature female lice exceeding 0.1/fish need clarifying. Do farms become ineligible for certification? Will there be the option to slaughter and retain certification?

3.1.8. This standard can be incorporated as part of 3.1.4. and 3.1.6. and does not need to stand alone.

3.2 Introduction of non-native species

3.2.1. We recommend including a definition of “widely commercially available” (we believe this was defined in the PAD in relation to establishment issues). It would be preferable that this be permissible only where the non-native species is widely commercially available **and** there is either science or incidental evidence from historical escapes that demonstrates that the risk of establishment is low. Furthermore, “widely commercially available” should be defined from the date of standards release or backdated to the beginning of the SAD process, so that the need for interpretation is eliminated along with any incentive to establish species in new areas based prior to release of the standards.

FishWise is supportive of the continuous improvement note re: ongoing research and need to update standard with most current research every 3-5 years. We suggest that more thought should be given to how to add a more precautionary element to the current content which allows the farming of non-natives until there is a demonstrated risk – by this time it is too late and this is not an approach in keeping with the precautionary principle. A progressive option would be to only allow expansion of farming of non-natives in RAS or as sterile populations.

3.2.2. We suggest stipulating that species used for biological control, even if native, should not interact with wild populations. Such an assertion needs to have been studied in the region in question with results published in peer-reviewed literature.

3.3 Introduction of Transgenic Species

3.3.1. FishWise is supportive of this standard.

3.4 Escapes

3.4.1. As drafted, it is not clear what the “exceptional episodes” would entail if not extreme weather or accidents outside the farms’ control. E.g. is human error by staff something the farm would “have no reasonable way to predict?” Examples of acceptable exceptions should be given to provide a clearer understanding.

3.4.2. It is not entirely clear how 3.4.1. and 3.4.2. interact. We assume this means that there could be one escape episode of no more than 300 fish in a ten year period and a farm would retain certification. We assume **it does not** mean that there could be one escape in a ten year period of an unlimited number of fish **and** regular escapement as long as they were small events (<200 fish) and therefore not counted as “escape episodes” under 3.4.1. and not large enough bouts to trigger 3.4.2. (?)

It may make sense to make escapement a function of net area or production volume or some other parameter that standardizes events relative to scale of production.

3.4.5. This standard should already be covered under P1 and could be removed.

<u>Principle 4. Use Resources in an Environmentally Efficient and Responsible Manner</u>

4.1 Traceability of raw materials in feed

4.1.1. Traceability on trace feed ingredients could be significantly costly with relatively few impacts in terms of sustainability. It would be more pragmatic to ask for traceability on all ingredients that make up >x% of feed. The ShAD standard has proposed 5%.

4.2 Use of wild fish for feed

4.2.2. It is FishWise’s understanding that current numbers are based on minimum fish inputs if all FM/FO were coming from non-byproduct sources. Therefore, there is currently little incentive to use “free” by-products/alternative feed formulations because thresholds can be reached without substitution away from targeted reduction fishery inputs. The same may be true for proposed values of EPA/DHA, which may not promote the use of “free” byproducts. [For the EPA/DHA standard, we suggest modifying the wording to “from direct non-algal sources” or something similar. Use of microalgal EPA/DHA should be encouraged if/when it becomes commercially available.]

Market prices for FM/FO are driving feed manufacturers towards alternative formulations with less FM/FO. At the same time, the values for FFDR put forward in this draft suggest that feed manufacturers still want the option of formulating with highest quality FM/FO from targeted reduction fisheries alone. We question whether these values are not higher than present formulation alternatives would allow, when using some percentage of “free” FM/FO from byproducts. FishWise recognizes that there are associated effluent trade offs associated with increasing byproduct inputs, but would like a clear rationale for the suggested numbers that covers why these values are set at a level that relates directly back to the standard’s environmental objectives, rather than flexibility of formulation.

4.2.3. We urge the steering committee to consider a PRE where various forms of protein are weighted relative to primary production. Some protein is environmentally expensive to produce, some isn't - there should have to be accounting for the ecological cost/trophic level of the type of protein used. From an ecological perspective, a weighted approach would talk about the efficient use of protein in standardized ecological units, rather that in rather illogical units of mixed plant/byproducts/LTLF (dry) proteins in to (wet) salmon protein out. We assume that protein is measured based on N content and isn’t affected by wet or dry issues (?)

4.3 Source of marine raw materials

It would make sense to have a parallel request for the presence and evidence of a responsible sourcing policy for the feed manufacturer for feed ingredients of marine origin, as per 4.4.1 for non-marine raw materials.

4.3.2. FishWise strongly recommends setting this standard with FishSource scores all at a minimum of 6, with Scores 1, 2 and 3 together summing to 24 (average score of 8 each). Scores 1, 2 and 3 are the most important in terms of the longterm wellbeing of populations because they relate to management practices, while Score 4 is less predictive – giving a snapshot of the current health of a population that may be growing or shrinking.

Scoring at a level of 6 for Scores 2 and 3 as currently proposed represents harvesting at levels 25% above scientific advice and 25% over quota respectively. The current proposal would allow retailers to claim responsible sourcing associated with FM/FO fisheries that are knowingly over-harvesting the base of the food web in significant ways, even from a single-species perspective (FS scores of 6). This is deliberately irresponsible practice, particularly if these fisheries are not in FIPs or any type of improvement process subject to market consequences. We also point out that multiple low scores have additive consequences on population wellbeing (e.g. a population that is harvested 25% above advice and then 25% over quota, experiences two, compounding impacts).

The proposed option is an attempt to 1. allow for inter-annual variation in scores, 2. assure sufficient volume of supply, 3. permit flexibility in formulations, while 4. maintaining a more defensible sustainability bar. This options would allow sourcing from 8 fisheries, which together account for 57% of the scored supply. The existing proposal would allow sourcing from 10 fisheries which together account for 66% of the scored supply. We also point out that more eligible fisheries may become available as SFP further populates the FishSource database, further increasing volume and number of scored fisheries.

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The reason that we see FS scores as relevant - given that they are an interim option - is that it remains to be determined whether there will be serious contention by the scientific community over the validity of the approach adopted for low trophic level fisheries by MSC. MSC's consultation period is currently scheduled to close prior to the release of Lenfest's findings and if there is not general agreement between the two bodies of scientists, then there remain serious questions about the legitimacy of MSC as a responsible way to source FM/FO. If such contention exists, and even if it doesn't, we suspect interim standards will be used in a meaningful way for the next 3-5 years.

4.3.4. We recommend adding "… according to the IUCN Red List of Threatened Species *or national listing processes*".

Criterion 4.4. Source of non-marine raw material in feed

4.4.3. It may be better from a label credibility perspective to broaden this standard re: GM transparency to all ingredients, rather than only plant raw materials (this intent is conveyed in the additional information section). We concur that at present, this issue relates to inputs of plant origin, but in the future, there could be situation where for example, trimming of transgenic fish might be used. Modifying the standard would make for a simpler claim and avoids necessitating future changes.

Criterion 4.6.

4.6.1-4.6.3 – FishWise supports the SAD's inclusion of standards that require accounting for energy use in feed emissions. We also applaud the work associated with creating Appendices relevant to standards 4.6.1-4.6.3. Have the cost implications of further ISO certifications associated with these standards been taken into account?

Criterion 4.7 Non-therapeutic chemical inputs

FishWise is concerned about the acceptable use of copper nets/copper impregnated nets on benthic sediment/water pollution. Please see the general comments section above.

4.7.5. "…. And used as recommended by legislation/regulation or manufacturer's recommendations, whichever is more stringent".

We support close attention to emerging relevant research/changes in legislation. We suggest including in the indicator the following stipulations: a) a review of the existing legislation and research occurs once per year in the three selected jurisdictions, and b) a responsible party for this review, so that this really does occur.

<u>Principle 5. Manage Disease and Parasites in an Environmentally Responsible Manner</u>

5.1 Survival and health of farmed fish

5.1.5. FishWise would prefer to see this number moderated over more production cycles. High mortality once every three cycles, if happening regularly, is problematic and also could bring with it elevated disease risk etc. We recommend increasing the number of cycles over which maximum mortality is recorded and increasing the acceptable maximum mortality rate slightly if necessary.

5.2 Therapeutic treatments

5.2.5. FishWise does not have the husbandry expertise to suggest alternatives for the PTI. A possible alternative may be to create two PTIs – one for broad spectrum parasiticides or parasiticides for species where resistance has serious industry consequences/ecosystem consequences and another for more targeted parasiticides and parasiticides where resistance is not a key concern, or where toxicity is thought to be low for non-target species.

FishWise suggests that impacts of the timing/use of parasiticides on other organisms/benthos be explicitly considered in the EIA and minimized - or where there is the potential for lethal effects, eliminated. Where there is evidence that parasiticides bring meaningful risk to species at risk, this could be grounds to preclude farms from certification.

5.2.7. FishWise is supportive of the decision not to use antibiotics listed as critically important for human medicine and to require a risk assessment for the use of WHO-listed highly important antibiotics.

5.2.8. – Footnote 79 raises significant issues in terms of traceability and scale of certification. This footnote also represents a significant loophole for farms to treat using prohibited chemical/antibiotics in some cages and not in others, if it is not specified that prohibition of these substances/practices is audited at the farm level.

5.3. Resistance of parasites, viruses and bacteria to medicinal treatments

5.3.1. We suggest that it would be more useful to do bio-assays in a prophylactic, rather than reactive manner to catch resistance as it is developing (in contrast to once developed). There is apparent inconsistency between 5.3.2. and 5.3.1 on when bio-assays should be done relative to the development of resistance.

5.4.4. FishWise recommends that ASC establish a fund such that if an exotic disease is detected and verified by a third party veterinarian on a farm, for a disease that does not have an established/effective treatment, a cull is immediately enacted and the farmer is compensated for projected production losses. Farmer's would need a veterinary certification or some similar evidence to access these funds.

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Principle 6. Develop and Operate Farms in a Socially Responsible Manner

Principle 7. Be a Good Neighbor and Conscientious Citizen

We strongly recommend harmonizing standards in P6 (and relevant portions of P7) across dialogues, particularly for labor issues.

6.2 Child Labor

There are currently differences in the minimum age of workers between the ShAD and SAD. (15 vs 18)

6.5.6. All divers should be in buddy pairs.

6.6 Wages – Additional specificity/options available in the ShAD standard.

6.6.2. It is not clear or auditable what “working towards” means here. This needs further refinement and specificity.

6.6.3. It is not clear what will be sufficient to constitute “evidence of transparency”. This needs further refinement and specificity.

6.12 Corporate policies for social responsibility

6.12.1. Company policies in relation to 6.1-6.11 should also be made publicly available.

Principle 8 – Standards for Suppliers of Smolt

8.1-8.2 - We suggest aligning compliance with applicable local and national legal requirements and regulations precisely with Principle 1. It is not clear why these would be any less relevant for smolt production. If only the existing standards remain in the final draft, the rationale should be expanded to cover this disparity.

8.4-8.7 – FishWise believes that certified farms should be strongly encouraged to source only from facilities that produce in closed containment facilities, at the time of certification (for the next production cycle). There is poor justification to allow sourcing from open systems given that the rationale states that “the vast majority of salmon smolt production takes pace in closed or semi-closed systems where these impacts can be significantly reduced in a way that is not possible in fully open systems, such as net pens”. Allowing sourcing from open facilities in a situation where this is not common practice is not consistent with rewarding the top 20% of global production. However, if the steering committee decides to allow smolt to be sourced from open facilities, we recommend modifying the timeline given in 8.25 from 5 to 3 years. Furthermore, we suggest that producers not be allowed to source from smolt producers working in lake systems with rare or endemic species, in closed lake systems, or in lakes with oligotrophic waters.

8.8 - We suggest modifying the wording to include treatment of both biological and non-biological waste.

8.8-8.10 – In parallel with minimal objectives associated with Principle 4, smolt producers should also be obligated to provide ingredient lists of their feed and to assure that no raw materials in feed are associated with CITES Appendix I listed species, or species listed as endangered or otherwise at risk under national listing processes.

FishWise notes that stipulations on P release may result in the use of feeds with high inclusion rates of FM/FO from targeted low trophic level fisheries (commensurate with high digestibility/retention), when other alternatives exist such as improving FCR and settling ponds/filters. Given the challenge of asking grow-out operations for documented practices extending two steps back through the value chain, we do not formally ask for this issue to be addressed at this time. However, if a feed dialogue becomes possible, this portion of the smolt standards should be revisited.

8.11-8.14 – For open systems, we suggest including a stipulation on DO or O_2 concentration as risk management against compromised condition and susceptibility disease amplification/transmission.

8.18 – Please see suggestions for standard 5.4.4.

8.20 - 8.23 – We suggest that 8.23 could be combined with 8.20 if desired.

8.26 – Hypoxic or anoxic conditions should be defined by a performance-based threshold.

8.27 – This rationale currently appears to be at odds with the intent of 8.24-8.28 which is structured to push producers towards closed production within 5 years and allows production only from open systems where a carrying capacity study *has been* conducted within the last 5 years. The text at the top of page 68 implies that a carrying capacity study could be conducted by the smolt producer *from the time of certification forward*.

A data collection list akin to Appendix VI should be included for smolt producers and these data should also be uploaded to the ASC online database in the interest of transparency, and in order to quantify baseline conditions associated with smolt production at the inception of the label's use.

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June 14, 2011
Steering Committee of the Salmon Aquaculture Dialogue
Aquaculture Stewardship Council
World Wildlife Fund
salmonaquaculture@wwfus.org

RE: Public Comments on Salmon Aquaculture Dialogue Draft Standards

Please accept these comments on behalf of Food & Water Watch regarding the final draft of Salmon Aquaculture Dialogue Standards.

Food & Water Watch is a nonprofit consumer organization based in Washington, D.C. that works to ensure clean water and safe food in the United States and around the world. We work with various community outreach groups to create an economically and environmentally viable future. We advocate for safe, wholesome food produced in a humane and sustainable manner, and public rather than private control of water resources, including oceans, rivers and groundwater. The Food & Water Watch Fish Program works to promote clean, green, safe seafood for consumers, while helping to protect the environment and support the long-term well being of coastal communities.

Choosing the best fish to eat can be complicated.
Consumers are searching for information to assist them in purchasing sustainable seafood. The Aquaculture Stewardship Council's plan to certify salmon open net pen aquaculture, however, has no merit and will likely mislead consumers into thinking that fish raised in these farms are a sustainable choice. While we understand that the intent of the certification is to raise awareness about sustainability, it is highly dubious that allowing such labels for products from less-than-sustainable operations will attain this goal. Food & Water Watch does not believe that salmon net pen farming should receive any sustainability label due to the use of pelagic fish in farmed fish feed, impacts caused by escapes of farmed fish, drug use to treat disease in crowded net pens and the implications all of these issues have on the health of the seafood product that these open net pen farms produce.

Inefficient feeds for farm-raised fish
Although one might assume that farming fish could take the pressure off wild stocks, this is not actually true. Farmed fish require healthy feed in order to thrive, and they are often fed large amounts of feed made from fishmeal and oil. Typically, it takes about five pounds of wild fish to produce one pound of dry fishmeal or oil, which in turn constitutes somewhere around 40 percent of fish feed.[i] On average, marine finfish gain one pound for every two pounds of feed that they eat.[ii] Thus for every pound of farmed fish that is produced for human consumption, it can take between two to six pounds of wild fish to produce.

These ingredients are derived almost exclusively from small ocean fish such as sardines, anchovies, and herring, caught in mass quantities in the Northeast Atlantic and off of North and

South America's Pacific coast. Many species of small fish for aquaculture feed are being harvested beyond sustainable levels, not only leading to their depletion but also meaning that the predatory finfish that depend on them for survival **–** such as tuna, salmon, grouper, and snapper – are also in jeopardy.[iii]

Disease and Drug treatments affiliated with open net pen salmon farms

Sea lice are perhaps the most notorious of aquaculture infestations. This organism can rapidly increase in abundance in a specific area if there is a sudden increase in the presence of potential hosts, such as occurs with the expansion or addition of a fish farm. According to a 2011 article that examined various factors affecting the population of wild pink salmon in the Broughton Archipelago of British Columbia, exposure to salmon farms with infestations causes a "sharp decline" in wild salmon populations. The researchers wrote that "sea lice infestations may result in declines of pink salmon populations."[iv] In addition to sea lice, Infectious Salmon Anemia (ISA) has been a major problem for salmon farms. The disease was reported first in Norway, and later spread to Canada, Scotland, the Faroe Islands and the United States.[v] Around 2007, the virus wreaked havoc on the salmon industry in Chile – devastating production and putting many people out of work.[vi]

Antibiotics, pesticides and other drugs or chemicals used in these operations can also be damaging.[vii] Maine lobsters have been harmed by pesticides used to control sea lice in salmon farms along the Maine and Canadian coasts.[viii] Further, antibiotics can kill beneficial seafloor bacteria and spawn antibiotic-resistant organisms. One study found that the use of antimicrobials on fish farms can lead to the creation of reservoirs of drug-resistant bacteria. According to the study, the genes responsible for this resistance may ultimately affect the human population through transfer to human pathogens.[ix]

Healthy seafood

In addition, there is the possibility that farmed fish could contain higher levels of certain contaminants – such as PCBS, dioxins, flame retardants and pesticides – than wild fish. One study of salmon found that 13 out of 15 organocholorine contaminants are more common in farmed salmon than wild. [x]Another study has suggested that exposure to fish farms may increase mercury contamination in nearby wild fish. Rockfish around a salmon farm in British Colombia were found to have increased levels of mercury contamination after feeding off farm waste and uneaten feed.[xi]

Escaped farmed fish

Fish escapes are a major problem on open water fish farms. They can be caused by equipment failure, staff error and adverse weather conditions. Fish raised in aquaculture facilities are bred to thrive in farmed, rather than wild environments. When escaped fish interbreed with wild fish, their offspring may have diminished survival skills, resulting in a genetically less fit wild fish population. Escape has been a major problem with salmon, whose recovery from overfishing and habitat issues is being jeopardized by genetically inferior, domesticated interlopers.[xii] The international list of escape disasters is extensive: About two million farmed salmon escape into the North Atlantic each year, equal to the number of wild fish there.[xiii] In six months of 2007 alone, more than 100,000 Atlantic salmon escaped from four facilities on the west coast of Scotland.[xiv] On December 31, 2008 storms caused 700,000 salmon and trout escaped from various farms in Chile prompting the leader of the Chilean Senate's Environmental Committee to proclaim the incidents an "environmental disaster."[xv] In October 2009, 40,000 salmon escaped from a farm in British Columbia.[xvi] One year later, 70,000 salmon escaped from a farm in Norway.[xvii]

In sum, untreated fish waste, excess feed and dead fish from aquaculture facilities empty directly from cages into the natural waterways. This waste has been shown to alter fragile marine habitats.[xviii] With all of these concerns Food & Water Watch would suggest that Aquaculture Stewardship Council not go forward with its plan to certify the unsustainable salmon farm industry.

If you have any questions, please feel free to contact Zach Corrigan at

Sincerely,
Zach Corrigan
Acting Fish Program Director &
Senior Staff Attorney
Food & Water Watch

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[i] Tacon, Albert et al. "Use of Fishery Resources as Feed Inputs to Aquaculture Development: Trends and Policy Implications." FAO Fisheries Circular No. 1018, Food and Agriculture Organization of the United Nations, Rome, p. V. 2006.

[ii] Tacon, Albert et al. "Use of Fishery Resources as Feed Inputs to Aquaculture Development: Trends and Policy Implications." FAO Fisheries Circular No. 1018, Food and Agriculture Organization of the United Nations, Rome, p. V. 2006.

[iii] Marine Aquaculture Task Force, p. 89, op. cit.

[iv] Krosek, Martin and Ray Hilborn. "Sea lice (Lepeophtheirus salmonis) infestations and the productivity of pink salmon (Oncorhynchus gorbuscha) in the Broughton Archipelago, British Columbia, Canada. *Canadian Journal of Fisheries and Aquatic Sciences,* Vol. 68, 2001, at 17-29.

[v] Devold, M et al. "Strain variation, based on the hemagglutinin gene, in Norwegian ISA virus isolates collected from 1987 to 2001: indications of recombination." *Disease of Aquatic organisms*, Vol. 47, November 8, 2011 at 119-128.

[vi] "SalmonChile Anticipates Layoffs." ThefishSite, February 19, 2010.

[vii] "Sustainable Marine Aquaculture: Fulfilling the Promise; Managing the Risks." Report of the Marine Aquaculture Task Force, Takoma Park, MD, January 2007 at 74-76.

[viii] Trotter, Bill. "Parasites, Pesticides, Sick Salmon… Dead Lobsters." *Bangor Daily News*, January 10, 2011.

[ix] Heuer, Ole. E. et al. "Human Health Consequences of Use of Antimicrobial Agents in Aquaculture," *Clinical Infectious Diseases,* Vol. 49, No. 8, 2009 at 1248-53.

[x] Hites, Ronald A. et al. "Global Assessment of Organic Contaminants in Farmed Salmon." *Science*, Vol 303, January 2004 at 226-229.

[xi] Debruyn, Adrian et al. "Ecosystemic effects of salmon farming increase mercury contamination in wild fish." *Environmental Science and Technology*, Vol. 40, No. 2, 2006 at 3489-3493.

[xii] Marine Aquaculture Task Force, p. 3, op. cit.

[xiii] "Study to investigate wild/farmed salmon breeding implications." The Fish Site, Aug. 15, 2007.
[xiv] Reid, Melanie. "Great salmon escape could turn wild fish into 'couch potatoes'." *The Times* (UK), Sept. 18, 2007.
[xv] Witte, Benjamin. "Thousands of salmon and trout escape in southern Chile." *The Patagonia Times*, January 19, 2009.
[xvi] Lavoie, Judith. "40,000 fish escape farm." *The Times Colonist*, October 24, 2009.
[xvii] Grindheim, Joar. "Costly salmon escape." *IntraFish Media*, October 15, 2010.
[xviii] Pérez, Marta, et al. "Physiological responses of the seagrass *Posidonia oceanica* as indicators of fish farm impact." *Marine Pollution Bulletin* Vol. 56, Issue 5, 2008 at 869-879; Holmer, Marianne, et al. "Effects of fish farm waste on *Posidonia oceanica* meadows: synthesis and provision of monitoring and management tools." *Marine Pollution Bulletin* Vol. 56, Issue 9, 2008 at 1618-1629.

Dear Mrs Bostick
dear members of the FTAD steering committee
In regard to your work to develop global standards for responsible trout farming, we would like to express our strong support of the positions of fair-fish and Albert Schweitzer Foundation and would therefore like to join them in their call for the inclusion of several improvements regarding fish welfare and the reduction of wild forage fish used.
Best regards
Sebastian Zösch
CEO, German Vegetarian Union

From Don Staniford of Global Alliance Against Industrial Aquaculture

14th June 2011

Dear WWF,

Salmon Farming: No Right Way To Do The Wrong Thing

Further to the consultation on the Salmon Aquaculture Dialogue's draft "Standards for Responsible Salmon Aquaculture", the undersigned 'conscientious objectors' would like to voice our vehement objections. In addition to the 229 people signed onto this letter, there are currently over 500 people signed onto a petition letter: Stop the Certification of Farmed Salmon as "Sustainable" and "Responsible" (this petition remains open and you can view all the signatures online).

There are representatives from the following groups: Compassion in World Farming, Animal Concern, Environment Maine, Sierra Club BC, Save The Swilly, Friends of Clayoquot Sound, Salmon Are Sacred, Global Alliance Against Industrial Aquaculture, Ethical Voice for Animals, Xeni Gwet'in First Nation, Angling Trust, Orkney Seal Rescue, Trout Trust, Green Concern for Development, Collectif Peche et Developpement, Centro de Conservación Cetacea, Ecoceanos, Latin American Observatory of Environmental Conflicts, an Taisce/The National Trust for Ireland, Totem Flyfishers, Coalition for Fair Fisheries Arrangements, France Nature Environnement, Bureau Européen de l'Environnement, Pacific Coast Federation of Fishermen's Associations, Limerick Environmental Awareness Group, Coastal Conservation Association, Norwegian Salmon Association, Fundación Pumalín, CODDEFFAGOLF, Mapuche-Huilliche Community "Pepiukelén", JAF Foundation, Go Wild Campaign, International Collective in Support of Fish Workers, Fair Fish, Norwegian Coastal Fishermen Union, Scottish Sporting Services, Endangered Habitats League, Shellfish Network, Save Our Seals Fund, Norwegian Flyfishers Club, Salmon and Trout Restoration Association of Conception Bay Central Inc and the Institute of Fisheries Resources.

Opposition to farmed salmon standards and the certification of farmed salmon as "sustainable" and "responsible" is spreading all over the globe with the following countries represented: Canada, Chile, USA, United Kingdom, Scotland, Ireland, Norway, Germany, Belgium, Iceland, Netherlands, Croatia, Sweden, Switzerland, Spain, Israel, Greece, Denmark, Portugal, Argentina, Indonesia, France, India, Nigeria, Honduras, Italy, Australia, Poland, South Africa, Singapore, Mexico, Bangladesh, Brazil, Costa Rica and New Zealand.

We object in no uncertain terms to the proposed standard which shamefully allows: Waste Pollution, Chemical Contamination, Killing of Wildlife, Sea Lice & Infectious Diseases, Non-Native Species, Escapes, Unsustainable & Non-Certified Fish Feed, Transgenic Plants, Copper-treated Nets & Biocides, 20% Mortality, Antibiotics & Toxic Chemicals and Deaths of Workers (see Appendix).

We cannot conscionably endorse such an appalling standard and certification system to be branded by the Aquaculture Stewardship Council (ASC) as "environmental", "sustainable" and "responsible". Nor can we endorse a standard which ignores animal welfare issues and food safety issues as a "credible consumer label".

We also raise serious questions concerning the biased process and collusion between WWF, Marine Harvest and the ASC. It is clear that farmed salmon is crucial to the financial success of the ASC and there are vested business interests intent on watering down the standards to accommodate salmon farming. The only sensible solution is to exclude farmed salmon.

Put simply, there is no right way to do the wrong thing. As global citizens, we support the farming of fish species lower down the food chain that do not drain ocean resources or pollute water but we cannot conscionably endorse the farming of salmon as "sustainable" or "responsible". No amount of green window-dressing will alter the fact that salmon farming is irresponsible and inherently unsustainable.

The farming of carnivorous fish such as salmon is environmentally, socially, ethically and morally bankrupt. This reasoning led to the signing of the International Declaration Against Unsustainable Salmon Farming in 2008 and the 'conscientious objectors' signed onto this letter continue this global opposition to unsustainable salmon farming.

Nor are we alone in voicing concerns about the credibility of the WWF aquaculture standards process or the ASC. In May 2009, over 70 human rights and environmental groups from around the world expressed "outrage" at the launch of the ASC. In a letter sent to leading members of WWF, campaigners claimed that the organisation's plans to certify the industrial production of shrimp and salmon were influenced by the vested interests of the aquaculture industry, and did not reflect or take into account the wishes of local communities and indigenous peoples who live alongside shrimp and salmon farms.

Just last month over 50 'conscientious objectors' wrote to WWF opposing the final draft of the shrimp standards and certification of farmed shrimp by the ASC. Their letter stated that: "the final draft standards represent an extremely crude attempt at setting up 'standards'" and "the standards continue to perpetuate unsustainable and destructive open-throughput systems of aquaculture".

We are similarly outraged that WWF and the ASC intends on promoting a farmed salmon standard and certification system that sanctions the use of toxic chemicals, allows the killing of marine mammals, permits escapes and sea lice and endorses the use of uncertified and unsustainable fish feed as "sustainable", "responsible", "environmental" and "credible".

Ironically, so poor are the proposed standards and certification system that they would probably even fail as judged by WWF's own "Benchmarking Study: Certification

Programmes for Aquaculture - Environmental Impacts, Social Issues and Animal Welfare" as well as the "Global Aquaculture Performance Index".

We outline our reasons for objection in more detail below and enclose specific comments detailing our objections in the Appendix.

Farmed Salmon is Uncertifiable

Whilst many may have supported the WWF 'Salmon Aquaculture Dialogue' (SAD) process as one tool to potentially raise standards on salmon farms we strongly object to the certification of farmed salmon. Branding farmed salmon, in any shape or form, as "responsible" and "sustainable" as the ASC is intent on doing is unconscionable. The ASC's web-site and glossy brochure displays the following words:

Trying to fit farmed salmon into such an "environmental", "responsible" and "sustainable" system is like trying to cram a square peg into a round hole. The sad truth is that when we think of salmon farming in Chile, Canada, Scotland, Ireland, Norway and other regions of the world, the words "environmental", "credible", "honest", "independent", "efficient" and "social" do not immediately spring to mind.

This debate is similar to the debate about "organic" standards and certification for farmed salmon. In 2007, a coalition of conservation, organic, animal welfare and food safety groups opposed "organic" salmon farming since "the farming of carnivorous finfish in open net pen systems inherently contradicts organic principles". And just last month over 50 organizations, businesses and fishermen from across Canada and the U.S. signed a letter stating that the "'organic' label for farmed fish fails to meet fundamental organic principles". For many of the same reasons, salmon farming inherently contradicts the principles and "credible consumer label" advocated by the ASC.

When the SAD was initiated in 2004 the ASC had not even been created and it was not clear that any standards generated via the 'Aquaculture Dialogues' would automatically feed into the certification process via the ASC or be branded as "Sustainable Aquaculture". Some NGOs chose to support the dialogue process by attending SAD meetings, commenting on drafts and by being on the Steering Committee. Other NGOs made a conscious decision to oppose the dialogue in principle. Others ignored the process completely or were not aware of the implications of the SAD.

Now with the final draft of the farmed salmon standards published in May, nobody with an interest in salmon farming can ignore the full ramifications of the SAD. WWF plans "to finalize the standards in the third quarter of 2011" and the ASC is intent on certifying farmed salmon as "sustainable" and "responsible" via the publication of a guidance document by December.

Those who think that salmon farming can credibly meet the criteria of sustainability and responsibility and think that farmed salmon can successfully be certified by the ASC are themselves surely certifiable.

Salmon Farming is Fundamentally Unsustainable

Salmon farming is fundamentally flawed. The farming of salmon in open net cages or pens in the sea and in freshwater can never eliminate problems with escapes, infectious diseases, parasites, chemicals and waste pollution. Even closed containment systems on land or in the sea can never eliminate problems of energy use and the use of depleted and contaminated fish meal and fish oil.

Any farming process which leads to a net loss of resources can never ever be certified as "sustainable". Hence farmed salmon is red-listed by most NGOs such as Greenpeace. A report – "Canadian Net-Pen Aquaculture: Fundamentally Unsustainable" – published last year by the Conservation Council for New Brunswick, the Coastal Alliance for Aquaculture Reform and Greenpeace describes net-pen salmon farming as "an inherently vulnerable and unsustainable way of farming fish".

An article – "Environmentalists skeptical of Loblaw's boost for salmon farming" – published in *The Globe & Mail* in February opened with the line: "Sustainable isn't a word most people associate with salmon farming". Jay Ritchlin, director of marine and freshwater conservation for the David Suzuki Foundation (and a member of the Steering Committee of the SAD) said: "It's sort of the image of sustainability without the reality".

Even the industry concedes publicly that salmon farming will never reach "full sustainability". In a rare moment of candour Ruth Salmon, Executive Director of the Canadian Aquaculture Alliance (one of the Steering Committee members of the SAD) admitted earlier this month: "We won't ever get to a point where all sustainability issues have been resolved and reached a point of 'full sustainability'".

The Global Aquaculture Alliance's farmed salmon standards have also been criticized by groups such as the Coastal Alliance for Aquaculture Reform (who is represented on the Steering Committee of the SAD). As Jay Ritchlin of the David Suzuki Foundation (a member of the Coastal Alliance for Aquaculture Reform) stated in a press release – "Proposed salmon farming standards ignore environmental impacts" – in January:

"These standards suggest that most of the industry currently operates at a high level of sustainability and has effectively eliminated or minimized its threats to wild salmon and ecosystems. And that is simply not the case".

We share the same criticisms surrounding the WWF farmed salmon standards via the SAD. The scientific case and weight of evidence against salmon farming is simply too strong to ignore. The Coastal Alliance for Aquaculture Reform publicly admits that salmon farming is unsustainable:

"While some forms of aquaculture hold promise as sustainable options to meet seafood demand, the practices used to farm salmon, which consumes more fish protein than can be produced and causes harm to local ecosystems, puts undue strain on our oceans. High trophic fish, or fish high on the natural food chain, fetch the highest prices in the marketplace. As a result, growth in the aquaculture sector has been dominated by unsustainable production of salmon."

Even the Coastal Alliance for Aquaculture Reform (who have supported the SAD process and been on the Steering Committee since 2004) are not confident that a final standard and certification can ever be achieved. A report – "Better than the Rest? A Resource Guide to Farmed Salmon Certifications" - published by the Coastal Alliance for Aquaculture Reform in April stated that:

"However, there are many unresolved issues in the draft standard; it remains to be seen whether a rigorous and credible standard can be agreed upon by all participants".

The Coastal Alliance for Aquaculture Reform's web-page on the SAD also states: "This second round of public comment is an important stage in determining the final quality of the standards as there are unresolved issues and not all parts of the draft represent consensus agreement among the diverse members in the dialogue".

The Global Stench of Salmon Farming

The 'Global State of Salmon Feedlots' is currently in dire straits. 2011 is certainly not the time to be handing out accolades praising salmon farming for being "honest", "transparent" or "open" via certification of farmed salmon by the ASC.

In Scotland, following damning data obtained via a Freedom of Information request, the Salmon & Trout Association in April this year exposed the "sham of salmon farming industry claims". The report revealed serious breaches in sea lice thresholds; instances of mortality caused by sea lice; and evidence of a lack of efficacy of, or tolerance to, or potential resistance to available sea-lice treatments, including unexpectedly low sea-lice clearance rates using licensed treatments and failure to control sea-lice numbers.

In Chile, the industry has been ravaged by the spread of Infectious Salmon Anaemia (ISA), the illegal use of chemicals and antibiotics and other environmental scandals. A scientific paper – "ISA virus in Chile: Evidence of Vertical Transmission" - published in 2008 revealed "El gran secreto del salmón" (the big secret of samon) that ISA was spread to Chile by infected eggs from a particular company in Norway.

However, it was only finally publicly revealed in April 2011 that the company responsible was Aquagen. Aquagen is a Norwegian company whose shareholders include Marine Harvest, Skretting and Cermaq – both Marine Harvest and Skretting proudly sit on the Steering Committee of the SAD. Cermaq finally publicly conceded the spread of ISA via vertical transmission in a presentation in Norway only in April.

In Canada, the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River is beginning to open up the disease-ridden salmon farming industry in British Columbia to public scrutiny. *The Globe & Mail* reported last month in an article – "Cohen called on to release information on salmon virus" – that there could be 35 suspected cases of ISA in British Columbia and stated that: "Of great biological concern is that some of these diagnoses are in Pacific salmon, suggesting potential spread of a novel and virulent virus into native populations may be underway into the North Pacific."

Another disease issue in British Columbia is 'salmon leukemia' which may be responsible for killing up to three million wild salmon a year in the Fraser River. Documents revealed via the Cohen Inquiry show that the Canadian Government knew about the disease risk as early 2008 but failed to inform the public and First Nations. In fact, the first 'public' disclosure was via a report in *The Globe & Mail* in November 2010 sourced from an Access to Information Request. Later this year the Cohen Inquiry will investigate the link between salmon farming and the spread of infectious diseases.

So serious is the problem in British Columbia that earlier this year the Coastal Alliance for Aquaculture Reform (who sit on the Steering Committee of the SAD) served a 'Notice of Eviction' to the Canadian Government "to demand that Marine Harvest, Mainstream and Grieg Seafood vacate the Wild Salmon Narrows migration route for failure to operate responsibly in public waters". Such irresponsible behaviour by companies who together control 92% of BC salmon farms begs the question: how can any salmon farming operations in British Columbia possibly fit in with SAD's "Standards for Responsible Salmon Aquaculture"?

Shocking new video evidence of the waste impacts under salmon farms operated by Marine Harvest and Cermaq in the Broughton Archipelago was also published in April. And just today there was further damming video evidence published relating to Cermaq's impacts in the Clayoquot Sound UNESCO Biosphere Reserve.

Over in Eastern Canada, the situation is no better with the irresponsible and illegal use of toxic chemicals killing lobsters. The offices of Cooke Aquaculture – who brand themselves as "sustainable" and "environmental" – were raided in November last year "by dozens of officers from Environment Canada carrying guns and wearing flak jackets". In February, 20 groups, representing tens of thousands of Canadians, sent a letter to the Prime Minister of Canada urging him to curb the use of toxic pesticides on salmon farms. Sadly, the proposed "Standards for Responsible Salmon Aquaculture" sanctions the use of these same toxic chemicals.

In Norway, problems of chemical resistance, sea lice, escapes and waste impacts are escalating. In November 2009, WWF Norway threatened to red-list Norwegian farmed salmon due to problems with escapes, diseases, sea lice and chemical resistance. This is even more alarming when you consider that Norwegian farmed salmon is held up by the industry as the gold standard and WWF is funded by Marine Harvest.

The appalling history of salmon farming teaches us that this industry has its social licence and lost the right to pollute coastal and freshwater resources with impunity (watch 'Farmed Salmon Exposed: The Global Reach of the Norwegian Salmon Farming Industry'). The 'State of Information' reports (published by WWF as part of the SAD process) on diseases, escapes, chemicals, nutrient loading, benthic impacts, sea lice, feed and social impacts all illustrate the scale of salmon farming's problems.

Opening the can of worms that is salmon farming is stomach-churning (see the web-site Farmed Salmon Exposed and read "The Hidden Costs of Farmed Salmon" for more background). The global salmon farming industry has demonstrated time and time again that it is simply not responsible enough to gain the trust of consumers, coastal communities, fishermen, First Nations and concerned citizens. Salmon farming companies have invested more money in hiring public relations firms and financing expensive advertising campaigns rather than stemming the tide of escapes, tackling disease problems or dealing with interactions with wild fish and marine mammals.

In view of such a legacy and litany of global impacts, WWF and the ASC cannot be allowed to simply re-brand salmon farming as "sustainable" and "responsible". To do so would be tantamount to getting away with murder. Juan Carlos Cardenas of Ecoceanos in Chile (where over 50 workers and divers on salmon farms have died in the last six years) told *The Ecologist* in January that: "The true cost of the cheap salmon you eat is being paid with the blood of our people and the health of our oceans". And Chief Robert Joseph of the Musgamagw Tsawataineuk Tribal Council in British Columbia (who is engaged in an ongoing class action lawsuit against salmon farming) likened the killing of wild salmon by salmon farming companies as "genocide" in a letter sent last year to the King of Norway.

The Greed of Feed

Of all the problems afflicting the global salmon farming industry, the feed issue is perhaps the biggest and ultimately the fatal flaw. By draining our oceans to fuel the expansion of salmon farming we have mortgaged the future while accruing massive ecological, social and public health debts. The so-called 'Greed of Feed' is driving the industry to greater depths in search of wild caught fish to feed to farmed salmon. In his essay – "Aquacalypse Now" - Dr. Daniel Pauly from the University of British Columbia likened this to a "giant Ponzi scheme, waged with Bernie Madoff–like callousness".

The exploitation of wild fish for use in salmon feed, rather than for direct human consumption, raises moral, ethical and food security issues. According to Rodrigo Pizarro of Terram (who are represented on the Steering Committee of the SAD): "To produce a food source which is at the top of the food chain is clearly inefficient and even morally questionable" (as reported in 2011 by *The Santiago Times*).

Dr. Albert Tacon – author of the Technical Working Group report on feed for the SAD – has also raised the ethical issue of using wild fish in feed. His paper "Fishing for Feed or Fishing for Food: Increasing Global Competition for Small Pelagic Forage Fish" published in *Ambio* in 2009 concludes that "there are growing doubts as to the long term sustainability of many existing agricultural and aquacultural food production systems to meet the increasing global demand for food".

In Peru, Dr. Patricia Majluf is campaigning for the direct human consumption of anchovies rather than use in fish meal. *FISHNET* reported in February that:

"We need 'fish meals not fish feed'" argued Dr. Patricia Majluf from Peru. Put simply - fish feed multinationals are stealing perfectly healthy food out of the mouths of Peruvians. Farming salmon is inherently unsustainable - full stop, period. As Dr. Jennifer Jacquet from the University of British Columbia put it, "if you're farming a predator you'll always get less out than you put in".

As Dr. Daniel Pauly from the University of British Columbia puts it - salmon farming is equivalent to robbing Pedro to pay Paul. Farmed salmon clearly has no rightful place within a certification system which serves to "increase the availability of certified sustainable seafood" and "to promote the best environmental and social choice in seafood".

A paper – "Effect of aquaculture on world fish supplies" – published in *Nature* in 2000 detailed how salmon farming in particular was increasing pressure on ocean resources via the use of wild fish for fish meal and fish oil. Another paper - "Raising Tigers of the Sea" – published in 2005 stated that "Nearly all farm operations for carnivorous diadromous fish and marine finfish are net fishery "reducers" rather than "producers," i.e., the quantity of fish inputs often exceeds outputs in terms of farmed fishery products by a factor or two to three".

Salmon farming is even less efficient with inputs exceeding outputs by a factor of five (or in the case of Chile, by a factor of 10). Even with reductions in the use of wild fish resources the fish-in-fish-out ratio for farmed salmon was calculated at 4.9 in a scientific paper published in 2008 and 5.0 in a scientific paper published in 2009. In other words, it takes five tonnes of wild fish to produce one tonne of farmed salmon.

In some salmon farming sectors that figure is even higher. In Chile, for example, a report – "Salmon Piranha Style: Feed Conversion Efficiency in the Chilean Salmon Farming Industry" – by Terram published in 2006 calculated that the figure for Chilean salmon farming was 8.5 in 2004 but predicted to rise to 9.9 by 2013 (this report was ratified by the Steering Committee of the SAD). An industry which uses 5-10 times more resources than it produces can never, by definition, be "sustainable".

Food Safety and Welfare Issues Ignored

It is a fundamental flaw of the standards that neither food safety nor animal welfare issues are addressed. How can consumers and retailers have any confidence in a certification system which does not factor in cancer-causing contaminants such as PCBs or fish welfare issues? Shamefully, the ASC's web-site is meanwhile promoting a "credible consumer label" when consumer interests are being treated with contempt.

The final draft of the SAD's "Standards for Responsible Salmon Aquaculture" concedes that: "The Steering Committee has decided, however, not to comprehensively address farmed fish welfare in the standards document" (p7). A standard which allows up to 20% mortality rates on farms (p41) and fails to address welfare issues such as body deformities, cataracts, fin and tail damage and sea lice damage is simply not credible to consumers (for more background read "In Too Deep: why fish farming needs urgent welfare reform" and "Closed Waters" by Compassion in World Farming).

Moreover, a standard which sanctions the killing of marine mammals is arguably in direct contravention of the US Marine Mammal Protection Act (and consequently could lead to a ban on imports to the US market). Whoever made this decision should hang their head in shame – like this sea lion killed in a salmon farm net operated by Mainstream in British Columbia. According to the final draft of the standard such a lethal salmon farm would be allowed to be certified by the ASC (see Appendix).

In British Columbia, marine mammal deaths are significant. In a report released by the Department of Fisheries and Oceans, (the federal department responsible for marine mammals) the BC salmon farming industry, between 1989 – 2000 legally killed 6,243 seals and sea lions. New data from the Canadian Government was due to be published in April but is still not available online.

In Scotland, the Government earlier this year sanctioned the mass slaughter of 1,300 seals. John Robins of Animal Concern and Save Our Seals Fund said: "If you buy Scottish salmon you pay for bullets to shoot seals". Those who endorse these standards are effectively loading bullets in the gun to kill marine mammals and other wildlife.

Food safety issues such as chemical contamination have been ignored completely. The standards fail to tackle the vital issue of dioxins, PCBs, dieldrin, toxaphene and other cancer-causing contaminants in feed – both in terms of food safety and in terms of environmental contamination. This is a serious oversight in view of a scientific study in *Science* which showed significantly higher levels of cancer-causing and other health-related contaminants in farm raised salmon than in their wild counterparts. The study concluded that "the contamination problem is likely related to what salmon are being fed when they're on the farm". Another paper published in *Environmental Health Perspectives* stated that: "polychlorinated biphenyls (PCBs), toxaphene, dieldrin, dioxins, and polybrominated diphenyl ethers occurred at higher concentrations in European farm-raised salmon than in farmed salmon from North and South America".

Contamination of sediments under salmon farms with polycyclic aromatic hydrocarbons (PAHs), PCBs and DDE has also been shown in Canada. In Scotland, PCB contamination together with contamination of sea lice chemicals such as teflubenzuron, cypermethtrin, emamaectin benzoate and ivermectin has been detected under salmon farms by the Scottish Environment Protection Agency. Residues of emamectin benzoate (SLICE) exceeding Health Canada standards were also detected in the flesh of farmed salmon in a study published just last month. Yet the standard fails to demand decontamination of fish meal and fish oil or recommend other decontamination strategies as outlined in the Technical Working Group on feed.

Bias and Corruption

We have serious concerns in relation to the management of the ASC and the inclusion of farmed salmon under their banner of "sustainable aquaculture" in particular. Some have gone so far as to accuse WWF and Marine Harvest of ‘corruption’. In May 2009, a letter to WWF signed by over 70 human rights and environmental groups from around the world argued that “the planned certification process is inherently flawed in favour of the aquaculture industry”.

According to Natasha Ahmad of the Asia Solidarity Against Industrial Aquaculture: “The proposed certification by WWF promises to legitimise environmentally and socially damaging forms of aquaculture in the name of cheap prawns and salmon. It's high time that WWF stops 'Pandering' to the interests of big business, and instead begins to listen to the voices of real people that rely on the oceans and forests to survive”.

At a meeting of the Salmon Aquaculture Dialogue in Bergen in November 2009 there was a protest by the Green Warriors of Norway (Norges Miljøvernforbund) who unveiled a “Skin the Corrupt Panda” banner with a graphic of a panda eating from bucket of money straddling a sea lice infested farmed salmon with a Marine Harvest label and the tag-line “WWF på pengejakt!” (“WWF on the Money Hunt!”).

A press release - “WWF undermines the environmental movement” – accused WWF of “harming the environmental movement and the environment by attempts to greenwash salmon farming”. It stated:

“When WWF is backing this industry, the WWF is working against both the environmental movement and the environment itself. The reason is probably that Marine Harvest pays WWF a lot of money”.

In fact, Marine Harvest’s ‘Partnership with WWF Norway’ involves Marine Harvest paying money directly to WWF Norway. In 2008, WWF Norway admitted that Marine Harvest pays 800,000 NOK (US$ 147,000) per year to WWF for a full time staff position and support for their marine program (Maren Esmark, pers.comm – in an email dated April 2008). WWF Norway reported in 2009 that: “WWF partnered with Marine Harvest, the world’s largest salmon farmer, in 2008. MH commits to being an environmental market leader and to raising their environmental standards through dialogue and cooperation with WWF, and provides valuable funding for WWF-Norway’s marine conservation work”.

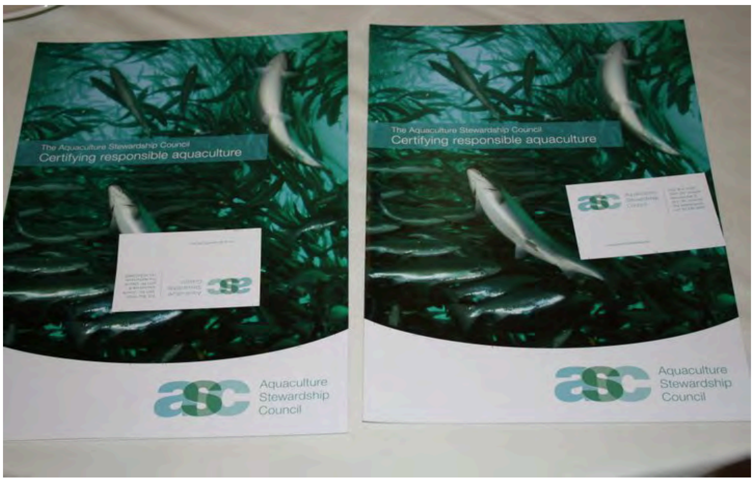
WWF Norway admitted earlier this month that: “Marine Harvest and WWF-Norway entered a 3 year agreement in April 2008, which included an annual support of 850 000 NOK to WWF Norway's marine conservation program” (Rasmus Hansson, pers.comm). WWF Norway has therefore received 2.55 million NOK (US$ 469,000) from the largest salmon farming company in the world.

WWF US has also received money from Marine Harvest (as well as Skretting, the Canadian Aquaculture Alliance, SalmonChile and Norwegian Seafood Federation). WWF Norway explained this month that:

“The Salmon Aquaculture Dialogue is funded in equal amounts by each of the Steering Committee member organizations, including Marine Harvest, with the exception of one NGO that has fewer financial resources. This shared funding is a reflection of the shared, multi-stakeholder approach to dialogue and problem-solving that the Dialogue has promoted and stood for. Although Salmon Dialogue funds are managed through WWF US, the SC jointly agrees on how funds are spent and the funds do not cover any WWF US salaries or expenses. Steering Committee member organizations have contributed approximately $35,000 USD each to the Dialogue” (Rasmus Hansson, pers.comm).

The “panda cash machine” extends not just to salmon farming companies but also to polluting oil companies, logging companies and mining companies. In an article titled “Panda Porn”, Jeffrey St. Clair argues that WWF have been brain-washed as well as green-washed and are “little more than the well-paid zombies of the corporations they have gotten into bed with”. Little wonder then that the farmed salmon standard appears to have been written by Marine Harvest (see Appendix).

The financial benefits to WWF, Marine Harvest and the ASC by promoting farmed salmon as “sustainable” and “responsible” are all too clear. You only have to look at the front cover of the ASC’s glossy brochure to realize that farmed salmon is central to the ASC’s marketing strategy and financial success.



Hank Cauley of Pew Charitable Trusts (who is on the supervisory board of the ASC) admitted last year (in an email to Pew Environment Group) that: “Salmon and its certification under the ASC is immensely important as, ultimately, 5-7 years out, a slight majority of its label royalty stream will come from the certification of salmon. This is why getting the SAD standards in place on a timely basis is so important. Without salmon standards, the ASC won’t make it unless foundations are willing to foot the bill for a long time and that increasingly looks unrealistic”.

Moreover, it is clear that WWF and Marine Harvest (the largest salmon farming company in the world) have a close business relationship and vested interest in promoting salmon farming as “sustainable”. Marine Harvest’s web-page ‘Sustainability Highlights’ links to a web-page on the ‘Salmon Aquaculture Dialogue’ stating that: “Marine Harvest is a member of the steering committee of the Salmon Aquaculture Dialogue. The dialogue is coordinated by the WWF US”. Marine Harvest’s web-page ‘Working with the WWF’ states that: “Through our participation in the Salmon Aquaculture Dialogue initiated by WWF-US and our partnership with WWF-Norway, Marine Harvest has a broad cooperation with the environmental conservation organisation”.

Marine Harvest’s web-page ‘Sustainable Seafood’ quotes Jose Villalon, Director of WWF-US Aquaculture Program, who says that “aquaculture is the most sustainable way to feed the world”. Jose Villalon not only is an ex-employee of Marine Harvest but he also oversees the Aquaculture Dialogues, sits on the Steering Committee of the Salmon Aquaculture Dialogue (along with Petter Arnesen of Marine Harvest) and is the Chairman of the Supervisory Board of the ASC. WWF have publicly promoted Petter Arnesen of Marine Harvest as a stakeholder in the Salmon Aquaculture Dialogue as someone with an “interest in sustainability” and someone who “throughout his career has been protecting the environment”.

The incestuous relationship between Marine Harvest, WWF and the ASC is also abundantly clear. WWF is a ‘partner’ in the ASC and Nutreco (the largest salmon feed company in the world and former owner of Marine Harvest) is a ‘supporter’. The architect of the ASC is Philip Smith who was Development Director and CEO of the ASC from August 2009 until he departed in April. According to the ASC’s web-site: “Philip Smith was Managing Director of Marine Harvest Europe, a leading seafood company and largest producer of farmed salmon. Prior to this he held positions as Managing Director of the Aquaculture Feed Division of Nutreco and CEO of EWOS, a leading supplier of feed for the international aquaculture industry”.

In May 2011, it was announced that Philip Smith was appointed as non-executive director of a salmon farming company (the Scottish Salmon Company). The press release stated that:

“From 1997 to 2001, Philip was CEO of EWOS, during which time the company became the global leader in the salmon feed market. Thereafter, Philip was managing director of Nutreco Aquaculture's Business Group Feed, with global responsibility for feed and the farming of non salmonid species, and was later appointed managing director of Marine Harvest Europe. During his tenure at Marine Harvest, Philip was responsible for a business producing 140,000 tonnes of salmon per annum, employing 1,400 people in Norway, Scotland and Ireland and in the European further processing and sales operations.

For the last eighteen months, Philip has been CEO of the Aquaculture Stewardship Council (ASC), co-founded by World Wildlife Fund (WWF) and Dutch Sustainable Trade Initiative (IDH) to manage and implement the international standards for environmentally and socially responsible aquaculture.”

So, in summary, the development of the ASC has been directed by people who previously worked for the world's largest salmon farming company (Marine Harvest) and/or the world's two largest salmon feed companies (Nutreco and EWOS). And the former CEO and Development Director of the ASC (Philip Smith) now works for a salmon farming company which plans to benefit financially from farmed salmon being certified as "sustainable" by the ASC. The whole sordid salmon farming story stinks to high heaven.

A Fish Too Far

The only sensible solution is to exclude salmon from the ASC. Far from rewarding salmon farming with the ASC's certification system, farmed salmon should be penalized by being excluded and left out in the cold along with genetically engineered fish, farmed tuna, farmed cod, farmed shrimp and other pariahs.

By accommodating farmed salmon, WWF and the ASC will serve only to water down and devalue the whole "sustainable aquaculture" brand. We note that four of the eights sets of Aquaculture Dialogue standards are already complete with tilapia, pangasius, bivalves and abalone handed over to the ASC for certification last month.

We are concerned at WWF's railroaded approach which has presented the standards process as a fait accompli – with a lack of dialogue on whether the certification of farmed salmon is a good idea or not. We all agree that is an urgent need for salmon farms around the world to raise standards of operation but that does not automatically mean there is agreement on the certification of farmed salmon by the ASC. However, we object to the salmon standards moving forward to the ASC. Salmon is a fish too far – along with shrimp.

Salmon and shrimp farming have many similarities – WWF ought to be aware of this better than most since WWF's Dr. Jason Clay was a co-author on a paper – Nature's subsidies to shrimp and salmon farming – published in the prestigious journal *Science* which addressed "unsustainable production practices". As this paper explains:

"Farmed species such as shrimp and salmon are fed nutrient-rich diets containing large amounts of fishmeal and fish oil extracted from wild-caught fish. The input of fish products is two to four times the volume of fish outputs for these crops. Because of their dependence on wild-caught fish, shrimp and salmon aquaculture deplete rather than augment fisheries resources".

Both farmed shrimp and farmed salmon have no rightful place within a "sustainable" and "responsible" certification system.

ASC Making the Same Mistakes as the MSC

Many criticisms of the ASC are similar to those levelled at the Marine Stewardship Council (MSC) which certifies wild fish. *The Guardian* reported in February under the headline "Sustainable fish customers 'duped' by Marine Stewardship Council" that:

"Richard Page, a Greenpeace oceans campaigner, said decisions to certify some fisheries "seriously undermine" the MSC's credibility. "I will go as far as to say consumers are being duped. They think they are buying fish that are sustainable and can eat them with a clean conscience".

In much the same way, we feel that consumers are being duped by the ASC into believing that farmed salmon can ever be "sustainable". It hardly inspires confidence that the ASC concedes that "where appropriate and possible, the ASC will pursue cooperation with the MSC". Nor does it inspire confidence that WWF helped set up the MSC and still endorse the MSC as "promoting sustainable seafood".

However, the difference between the ASC and the MSC is that we should be able to learn lessons from the experience. With the benefit of hindsight many people would have campaigned more vocally against the MSC if they had know the can of worms it was opening. For some it was by certifying hoki; for others it was Chilean sea bass or the Ross Sea Antarctic toothfish fishery; whilst the final straw for many was the certification of Fraser sockeye salmon or Antarctic krill.

In the ASC context it is salmon (and shrimp) which represent a fish too far. We ask that WWF and the ASC draw a line in the sand and refuse to go forward with the certification of farmed salmon.

Mission Impossible

An article published in January asked the question "Has the Marine Stewardship Council corrupted its mission?" We believe that the ASC's 'mission' – "To transform aquaculture towards environmental and social sustainability using efficient market mechanisms which create value across the chain" – has already been corrupted by the close relationship with Marine Harvest and the salmon farming industry.

Attempting to transform salmon farming into an "environmental" and "sustainable" industry is simply impossible and incredible. The expressions "mutton dressed as lamb", "wolf in sheep's clothing" and "if it walks like a duck, quacks like a duck, looks like a duck, it must be a duck" are all relevant to the discussion about whether farmed salmon should be labelled and marketed by the WWF and ASC as "sustainable".

The plain truth - based on scientific facts, documented information and public consensus – is that salmon farming is unsustainable and farmed salmon is not a sustainable product. We urge that WWF choose not to put their panda stamp of approval or dress a fake green fig leaf on farmed salmon by passing a final standard onto the ASC. WWF and the ASC should heed the advice of Advertising Standards Canada.

So Long And Thanks for the Fish

Finally, we can never support the certification of farmed salmon as “responsible”, “environmental”, “efficient”, “social” and “sustainable” by the ASC.

We take exception to being advised by WWF that our comments should “keep in mind” that: “The intent of the standards is to minimize or eliminate the key negative environmental and social impacts of salmon farming, while permitting the industry to remain economically viable”. It is surely not the mandate of an environmental group – which WWF purports to be – to maintain the economic viability of an environmentally polluting industry. If profitable salmon farming can never live in harmony with the environment then it has no future.

The stated goal in the draft standard of “defining environmentally and socially responsible production of farmed salmon” (p2) is illogical and impossible. How can you define something that simply does not and can never exist?

In addition, the final draft states that “these standards are intended to reduce key impacts from the status quo while also being economically viable and within the range of achievability for the industry” (p10). How can “sustainability” ever be “within the range of achievability” for an industry that is fundamentally unsustainable?

Common sense would surely dictate that farmed salmon standards are abandoned as unachievable. Sadly, common sense is not a currency that those engaged in salmon farming (and those ‘environmental’ group such as WWF who are green-washing salmon farming) are used to dealing in.

In view of such irreconcilable concerns we respectfully ask the Steering Committee of the SAD not to ratify a final standard to be “handed off” automatically to the ASC for certification. In the final analysis, please send the signal that salmon farming is not worthy of being included in the definition of “sustainable”, “responsible”, “environmental”, “credible”, “honest”, “independent”, “efficient” or “social”.

Yours sincerely,

The Conscientious Objectors

Signed by:

Pauline Adema, USA

Granville Airton, Canada

Mark Aislabie, USA

Richard Atkison, Scotland

Richard Auler (Ladybird Organic Farm), Ireland

Susan Bailey, Canada

Deirdre Balaam (Animal Concern), Scotland

Chief Marilyn Baptiste (Xeni Gwet'in First Nation), Canada

Roy Bartle (Trout Trust/Angling Trust), United Kingdom

Michael J. Bartlett, USA

Kylaina Bellman, Canada

Claudette Bethune, USA

James Bews, Scotland

Pal Biseth, Norway

Kathy Bluefield, United Kingdom

Arthur Bogason, Iceland

James Bramich, Scotland

Bev Brevis, Canada

Katrina Brink, USA

Jeremy Brouwer, Canada

Doug Brubaker, Canada

Fanny Brun (Collectif Peche et Developpement), France

Helen Buckley, Ireland

Sally Burt (Compassion in World Farming), United Kingdom

Elsa Cabrera (Centro de Conservación Cetacea), Chile

Simon Calder, United Kingdom

Sally Campbell, Scotland

Juan Carlos Cardenas (Ecoceanos/Latin American Observatory of Environmental Conflicts), Chile

Kiel Carnie, Canada

Dane Chauvel (Organic Ocean), Canada

Elspeth Cheshire, Scotland

Russell Cheshire (Ocean Breeze RiB Tours), Scotland

Georges Cingal (France Nature Environnement & Bureau Européen de l'Environnement), France

Betsy Hearne Claffey, Ireland

Michael Claffey, Ireland

Eric Conroy, an Taisce/The National Trust for Ireland, Ireland

Charles Coombs, Ireland

Robert Corlett, Canada

Katharine Coster, Canada

Sandra Craigie, Scotland

Karen Crocker (St. Mary's Bay Coastal Alliance), Canada

Dr. Elizabeth Cullen, Ireland

John Dawson (Knight Inlet Helisports Ltd), Canada

Craig Delahunt, Canada

Lawson Devery, Scotland

Mike Doherty, Ireland

Gael Duchene, Canada

Michael Easton (International EcoGen Inc), Canada

Comrade Edem Edem (Green Concern for Development), Nigeria

Elena Edwards, Canada

David Elkington, Scotland

Alex Ewing, Ireland

Teresa Ryan-Feehan, United Kingdom

Ross Flett (Orkney Seal Rescue), Scotland

Lindsey Fong, USA

Peter Ford, Scotland

Myrna Forrester, Scotland

Kevin Francis, Canada

Brian Fraser, Scotland

Daniel Frett, Canada

Emily Figdor (Environment Maine), USA

Cheryl Galloway, Canada

Niels Chr. Geelmuyden, Norway

Geoff Gerhart, Canada

Ocean Giesbrecht, Canada

Damien Gillis, Canada

Carol-Ann Giroday (Write From The Sea), Canada

Bonny Glambeck (Rainforest Kayak Adventures), Canada

Neville Gosling (Totem Flyfishers), Canada

Béatrice Gorez (Coalition for Fair Fisheries Arrangements), Belgium

Zeke Grader (Pacific Coast Federation of Fishermen's Associations), USA

Matt Gredo, Canada

Anne Gregoroff, Canada

Joshua Greenburg, Canada

Sean Griffin (Limerick Environmental Awareness Group), Ireland

Cecil Grinder, Canada

Paul Hallanan, Ireland

Angelika Hanko, Germany

Arne Hansen, Norway

Arne Roger Hansen, Norway

Tony Hauge, Ireland

Dr. Wolfram Heise (The JAF Foundation), Switzerland

Mike Heylin (The Angling Trust), United Kingdom

Heather Hill, Canada

Edward Hines, France

Anne Hunter (Animal Concern), Scotland

Norman Irvine, Scotland

Brian Islip, Scotland

Deena Johnson, Canada

Gary L Johnson (Coastal Conservation Association/Pacific County Angler), USA

Jeff Jones, Canada

Eric Joseph, Canada

Chloe Jowett, Scotland

Bernadette Keenan, Canada

B Kew, United Kingdom

Colin Kirkpatrick, Scotland

Daniel Kirkpatrick, Scotland

George Kirkpatrick, Scotland

Lena Kirkpatrick, Scotland

Geir Kjensmo (Norwegian Salmon Association), Norway

Hartmut Kloss, Germany

Angela Koch, Canada

Hector Kol (Fundación Pumalín), Chile

Eleftheria Konstantinidou, Greece

Bernie Lafferty, Ireland

Ryan Lake, Canada

Nadine LaPira-Wolos, USA

J.P. Laplante, Canada

Dan Lewis (Friends of Clayoquot Sound), Canada

Gordon Lewis, Canada

Krista Liebe, Canada

Yvonne Lilley, United Kingdom

Annette Lillig, Scotland

Christina Lizzi, USA

Maureen Loiselle, Canada

Jostein Lorås, Norway

Patrick Lulwa (Xeni Gwetin First Nation), Canada

Dave MacDonald, Scotland

Jackie Mackenzie, Scotland

Tania Mackenzie, Scotland

Jorge Varela Márquez (CODDEFFAGOLF), Honduras

Don McCarthy, Ireland

Sonya McCarthy, Canada

Carolyn McCommon, United Kingdom

Marion McDowell, Ireland

Diane McNally, Canada

Norma McNaught, Scotland

Varda Mehrotra (Ethical Voice for Animals), Scotland

Geoff Meggs, Canada

Francisco Vera Millaquen (Mapuche-Huilliche Community "Pepiukelén"), Chile

Dana Miller, Ireland

Antonia Mills, Canada

Hernan Mladinic (Fundación Pumalín), Chile

Roland Morgan, Canada

Stephen Morse, Ireland

Alexandra Morton (Salmon Are Sacred), Canada

Anne Mosness (Fisher's Choice Wild Salmon/Go Wild Campaign), USA

Ann Nicholson, Canada

John Niven (Save The Swilly), Ireland

Brian O'Riordan (International Collective in Support of Fish Workers), Belgium

Dr. Roderick O'Sullivan, United Kingdom

Pietro Parravano (Institute of Fisheries Resources), USA

Thorsten Peters, Ireland

Arch Pitcher (Salmon and Trout Restoration Association of Conception Bay Central Inc), Canada

Robert Pocock, Ireland

Alfred Pope (Bristol and West Branch Salmon and Trout Association), United Kingdom

Jørgen H. Poulsen, Norway

Tomás E. Valdés Puga (Org. Base Comunitaria Chinchimén), Chile

Alfredo Quarto (Mangrove Action Project), USA

Eila Quilt, Canada

Kimberly Quilt, Canada

Shyanne Quilt, Canada

Manfred Raguse (Norwegian Flyfishers Club), Germany

John Redfern, Scotland

Maxine Redfern, Scotland

Emma Redfern, Scotland

Anissa Reed (Salmon Are Sacred), Canada

Professor William Rees (University of British Columbia), Canada

Dennis Colin Reid, Canada

John Robins (Animal Concern, Animal Concern Advice Line and Save Our Seals Fund), Scotland

Reihana Robinson, New Zealand

Marjorie Roswell, USA

Julie Roxburgh (Shellfish Network), United Kingdom

Warren Rudd, Canada

Mary Russell, Canada

Bruce Sandison (Scottish Sporting Services), Scotland

Mike Savage, Canada

Sue Sayer (Cornwall Seal Group), United Kingdom

Rosalinde Schulze, Canada

Malcolm Scott (The Recycling Shop), United Kingdom

Jill Seymour, Canada

Richard Shelton (Buckland Foundation), Scotland

John Shiels, United Kingdom

Suzanne Shiels, United Kingdom

Chenoah Shine, Canada

M Shine (Highland Veggies and Vegans), Scotland

David Shipway, Canada

Dr. Nandita Shah, India

Dan Silver (Endangered Habitats League), USA

Ana Simeon (Sierra Club BC), Canada

George Slater, Scotland

Doug Smith, Scotland

Nigel Smith, Scotland

Gilbert Solomon, Canada

Don Staniford (Global Alliance Against Industrial Aquaculture), Canada

Karin Steinbrenner, Ireland

Bill Stephens, Canada

John Steven, Canada

Susan Stout, Canada

Pat Strand, Canada

Steve Strand, Canada

Frode Strønen (Norwegian Coastal Fishermen Union), Norway

Billo Heinzpeter Studer (Fair Fish), Switzerland

Theresa Stump, Canada

Renate Suso, Ireland

Patricia Swann, Ireland

Ed Sweeney, Ireland

Eileen Sweeney, Ireland

Peter Sweetman, Ireland

Wally du Temple, Canada

Vic Thomas, Scotland

Shelagh Thompson, Canada

Tibrol Tiholor, Canada

Douglas Tompkins (Fundación Pumalín), Chile

Romano Totoro, Chile

Alex Ugur, Ireland

Dawn Undurraga, USA

Mary Dawn Vickers, Canada

Laurie Watt, Canada

Frances Westermann, Canada

Bruce Wheeler, USA

Dan Willard, Canada

Marie William, Canada

Becky Wood, United Kingdom

Peter Wood, United Kingdom

David Woodhouse (Isle of Mull Wildlife Expeditions), Scotland

Sabra Woodworth, Canada

Bryan Yellow Horn, Canada

[Further signatures can be viewed via the online petition letter: Stop the Certification of Farmed Salmon as "Sustainable" and "Responsible"]

Appendix:

The proposed standard permits: Waste Pollution, Chemical Contamination, Killing of Wildlife, Sea Lice & Infectious Diseases, Non-Native Species, Escapes, Unsustainable & Non-Certified Fish Feed, Transgenic Plants, Copper-treated Nets & Biocides, 20% Mortality, Antibiotics & Toxic Chemicals and Deaths of Workers.

Unsurprisingly, the final draft of the Salmon Aquaculture Dialogue's "Standards for Responsible Salmon Aquaculture" reads as if it has been written by Marine Harvest and is not worth the paper it is written on. The entire document acts as an apologist for salmon aquaculture rather than a serious attempt to eliminate environmental and social problems. A standard which allows waste pollution, chemical contamination, killing of wildlife, sea lice and infectious diseases, non-native species, escapes, unsustainable and non-certified fish feed, transgenic plants, copper-treated nets and biocides, 20% mortality, antibiotics and toxic chemicals, and death of workers is a bad joke.

The "Standards for Responsible Salmon Aquaculture" offer an all too easy way for companies to green-wash their operations with minimal effort. The standard states that: "The unit of certification is a farming site. In undergoing assessment for certification, a company that owns multiple grow-out sites will be subject to compliance only at the particular site(s) for which they choose to undergo certification" (p7).

However, by adopting farm-level certification at individual salmon farms, companies will be able to brand themselves as "sustainable" and "responsible" based upon only one farm site. Marine Harvest, for example, promote their "organically certified" farm at Clare Island in Ireland whilst adopting even lower standards in Chile, Scotland, Norway and Canada.

Why not force companies to adopt the standard on a company level at every single salmon farm they operate?

Principle 1 (p12) merely endorses the status quo and the upholding of the law.

Principle 2 specifically promotes pollution via an "Allowable Zone of Effect" (Criterion 2.1) which extends for 30 meters from the cages (p14). In view of the size of some salmon farms this represents a huge area of impact.

There is ample evidence that the standards are half-baked and are being rushed out. Why is it that a "robust and credible modelling system" cannot be identified now instead of "within three years" (p14)? If the Steering Committee "is still in the process of reviewing comments" and needs to "further refine the standards" (p17) then why not delay?

Principle 2 claims to address "effects of chemical inputs" (p14) but why is there no treatment of toxic chemicals such as anti-foulant paints, pesticides, sea lice chemicals, antibiotics, artificial colourings and contaminants in feed? Nor is there any demand for treatment of waste effluent via closed containment despite the admission that "the release of nutrients into the environment from salmon farms was identified by SAD participants as a key impact of production" (p17).

Criterion 2.4.2 says that there is no "Allowance for the farm to be sited in a protected area or areas determined to be of High Conservation Value" (p18) but does not provide adequate definition. For example, Cermaq has recently applied for a new salmon farm within the Clayoquot Sound UNESCO Biosphere Reserve in British Columbia. Is this considered a protection area? And in Scotland, many salmon farms already operate within the boundaries Loch Roag Lagoons Special Area of Conservation. Is this considered an area of High Conservation Value?

Criterion 2.5.1 allows the use of Acoustic Harassment Devices (AHDs) for "two years of the date of publication of the SAD standard" (p20). Why not ban AHDs immediately?

Critierion 2.5.6 specifically allows the killing of wildlife with a standard identified of "<9 lethal incidents, with no more than 2 of the incidents being marine mammals" (p20). Why not adopt a zero tolerance for lethal incidents?

Moreover, the standards actively promote the spread of sea lice parasites and fail to tackle the issue of the spread of infectious diseases.

Principle 3 claims to address “impacts associated with disease and parasites” (p22) yet there is no reference to Infectious Salmon Anaemia, Furunculosis or other infectious diseases.

Criterion 3.1.3 allows for the “establishment of a maximum sea lice load” and Criterion 3.1.7 sets “maximum on-farm lice levels” of 0.1 mature female lice per farmed fish with an option for no monitoring at all (p22). Why is there not a zero tolerance for sea lice?

The argument that setting a “low” level of sea lice will only increase chemical use and chemical resistance shows how perverse the standards are:

“The Steering Committee is aware of that demanding an extremely low level could, in some situations, result in additional sea lice treatments that may not be needed to protect wild fish and could increase risks from resistance” (p25).

The long-winded discussion relating to Criterion 3.1 (pp23-26) illustrates the absurd nature of such a standard and the impossibility of reaching consensus. As the document states:

“However, determining the thresholds for lice on wild populations has proved to be challenging, particularly for Pacific wild salmon. Several experts advising the SC have suggested that it may not be possible to set a credible threshold for Pacific species at this time” (p26).

Criterion 3.2 allows the use of non-native species (p26). It is wholly unacceptable that “this standard permits the farming of non-native species in locations where production already exists” (p27). The farming of non-native Atlantic salmon in British Columbia, for example, represents a ‘super un-natural’ threat to native populations in terms of escapes and spread of exotic disease such as Infectious Salmon Anaemia.

Criterion 3.3 states that “the culture of genetically enhanced salmon is acceptable under the SAD” and “also allowed under the SAD standard is the cultivation of triploid or all female fish as long as those fish are not transgenic” (p27). This is unacceptable from a fish welfare perspective as well as ecological risks related to escapes.

Criterion 3.4.1 allows for an escape episode once in 10 years (p28) and Criterion 3.4.2 allows for 300 escapees in the most recent production cycle (p28). The document states that:

“These standards do not permit a certified farm to have a significant escapes event of 200 fish or more, except under extremely unusual circumstances in which the farm can demonstrate there was no reasonable way to predict the cause. The standards also place a cap on the total amount of fish that are allowed to escape through small events of less than 200 fish” (p29)

Why not a zero tolerance for escapes? In view of all the science detailing impacts of escapees, nothing less than zero is acceptable or “responsible”.

Criterion 4.2.1 proposes a Fishmeal Forage Fish Dependency Ratio of <1.35 and a Fish oil Forage Fish Dependency Ratio of <2.95 (p31-32). Moreover the document admits that these levels are “currently met by approximately 20-30% of the industry” (p33). In view of the depletion and scarcity of ocean resources nothing less than no net loss (i.e. <1) is acceptable. If 100% of the salmon farming industry cannot meet the standard then it merely proves that the industry is unsustainable. Setting the bar so low as to accommodate 30% of the global salmon farming industry, especially on such a crucial issue as feed, is irresponsible.

Criterion 4.3 allows the industry up to five years (p33) to comply with the standard and explains that: “This standard begins to be applicable 5 years after the publication of the SAD standards because there is a current lack of such certified sources of fishmeal and fish oil and the transformation of the industry will take some time” (p35). If there are no certified sources of fishmeal and fish oil then there should be no standard – it’s as simple as that. Moving the goalposts to allow for continued use of uncertified and unsustainable sources is unreasonable.

Criterion 4.4 shamefully allows the use of transgenic plant raw material, or raw materials derived from transgenic plants, in the feed (p36). The document explains that: “Transgenic plants are commonly used in aquaculture and animal feeds throughout the world. Some consumers and retailers want to be able to identify food products, including farmed salmon, that are genetically modified or that have been feed genetically modified ingredients. The SAD standards ensure transparency around any transgenic material used in the feed in order to support informed choices by retailers and consumers”. GM plants, labelled or not, have no place in an “environmental” standard.

Criterion 4.7 shockingly allows the use of copper-treated nets, copper contamination of sediments and other “biocides used in net antifouling” despite conceding that copper is “toxic”(p39). A responsible standard would advocate for a zero tolerance approach to copper use and contamination.

Criterion 5.1 allows mortalities of farmed salmon at up to 20% and a “maximum unexplained mortality rate” of 40% (p41). A standard which advocates a 20% mortality rate is a dead loss.

Criterion 5.2 allows for the use of antibiotics, parasiticides, therapeutants and other chemicals (p42). The document explains that:

“Standard 5.2.5 sets a maximum index score that a farm must achieve related to parasiticide use given the significant environmental concerns and effects on non-target organisms that may arise with excessive parasiticide use, especially of those parasiticides that are either more toxic or more persistent in the environment. The parasiticide treatment index (PTI) is intended as a proxy for the total amount of toxic parasiticide released into the marine environment. The PTI takes into account the sum of the average size of the salmon at treatment as a means to restrict the total quantity of parasiticide used per unit of fish produced. The standards allow for the use of toxic parasiticides due to a desire to keep lice levels low, in particular at times when wild fish may be most sensitive to high levels of lice in the marine environment.....The amount of parasiticide released into the environment will be proportionate to the total amount of biomass treated. Therefore, setting a cap on the amount of biomass treated per fish produced will put a cap on the amount of therapeutant that can be used. This allows for greater flexibility by the producer in terms of treatments while capping the environmental load” (p44)

Once again, only a zero tolerance approach can be described as "environmental". Allowing "greater flexibility" in relation to toxic chemical use is surely not a sign of a "robust" certification system.

Indeed, by advocating the use of toxic chemicals the Steering Committee are blatantly ignoring the Technical Working Group's report on chemicals. Nor is the Steering Committee addressing the impacts of toxic chemicals on lobsters. The document states that the Steering Committee is only "considering whether to put restrictions on treatment during times when lobster populations, if present, are known to be particularly sensitive" (p45).

Criterion 6.5 (p52) fails to address the issue of the deaths of workers and divers on salmon farms. There should be a zero tolerance for fatalities.

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Daniel Lee
*Organization/Company: GAA
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3			
Principle 4	4.31 and 4.3.3	Technically, ISEAL doesn't accredit. ISEAL defines codes and has members that include scheme owners. ASI accredits conformity assessment bodies for ISEAL members but not schemes.	Revise wording.
	4.32	In terms of promoting responsible sourcing, certification to the IFFO Responsible Supply standard, is a much better option than using FishSource scores. IFFO RS requires 3rd party , ISO-65 certification of compliance with the key components of the FAO Code of Conduct for Responsible Fisheries.	Compliance with IFFO RS should be the required standard here.
Principle 5	5.2.8 Allowance for	The standard states "none" yet the footnote	It would be better to have a clear policy on

	use of antibiotics listed as critically important for human medicine by the WHO	indicates that the farm can still use these antibiotics on some pens, with untreated pens still remaining eligible for certification. This raises the important question - What is the unit of certification? Is it the farm site (as indicated in the preamble) or is it a variable subset of compliant pens within the farm site?	critical antibiotics, one way or the other, to avoid this confusion.
Principle 6			
Principle 7			
General comments	Appendix VI: Transparency of farm-level performance data	Whether these data are made public or not is critically important to the character of the standard, yet the Steering Committee is delegating the final decision to the ASC.	On this sensitive question, make a decision, one way or the other, whether the database will be made public or not and do not leave it to the ASC to decide.
	WWF campaigns	Considerable confusion and conflict of interest arise when one branch of WWF campaigns against/redlists aquaculture while another develops and promotes aquaculture standards.	Stop one or the other.

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3			
Principle 4			

Principle 5			
Principle 6			
Principle 7			
General comments			

Dear Mrs. Bostick,
Dear Mr. Mathiesen,
Dear members of the FTAD steering committee,

Please find attached important recommendations by fair-fish and the Albert Schweitzer Foundation, to which I totally agree.

In regard to your work to develop global standards for responsible salmon and trout farming, we all would like to express our strong support of the positions of fair-fish and Albert Schweitzer Foundation and would therefore like to join them in their call for the inclusion of several improvements regarding fish welfare and the reduction of wild forage fish used.

Sincerely yours,

Stephanie Johanna Goldbach
Berlin-Charlottenburg
Germany

Dear members of the FTAD steering committee, and Salmon Aquaculture Dialogue steering committee:

Humane Society International applauds your efforts to develop standards for responsible freshwater trout aquaculture, and responsible salmon aquaculture. Further, we appreciate the opportunity to provide input to this important work during your public comment period.

HSI requests the World Wildlife Fund to take into account the welfare of fish in any certification scheme for aquaculture, by developing standards to minimize pain and discomfort to these animals during all stages of their life, and during the slaughter process.

There is a growing realization that many handling methods, management systems, and slaughter practices within aquaculture can induce pain and therefore reduce animal welfare. However, unlike other animals raised for human consumption, fish have not always been afforded the presupposition that they are capable of feeling pain, and this has resulted in an almost complete neglect for their welfare. We have attached a thorough review of the scientific evidence relating to the neuroanatomical development, behavioral and cognitive complexity, physiology, and anatomy of fish, which irrefutably substantiate that fish are capable of experiencing pain and discomfort. We have also attached a science-based assessment of the welfare of animals in the U.S. aquaculture industry. Based on this evidence, we request that all responsible aquaculture standards include the following components:

1. Species appropriate structure of the artificial habitat: creating a variety of flow velocities, and light/shadow; providing sufficient space/environmental enrichment to allow for withdrawal of subdominant individuals.
2. Species appropriate stocking density: each animal should have

sufficient space to swim in all directions without coming into contact with another fish or the limits of an enclosure.

3. Minimize stress and fear: avoidance of rapid temperature changes, noise, and unnecessary handling.
4. Minimize pain and stress at time of slaughter: stunning before slaughter (animal unconscious at time of slaughter); stunning and slaughter completed quickly and with minimum handling.
5. Genetic manipulation must not compromise welfare: genetic manipulation via extant breeding technologies or biotechnology must favor traits that enhance welfare, and avoid traits that diminish animal welfare.

HSI is happy to provide additional research support and expertise relating to the fish welfare, as these standards are further developed and finalized.

Thank you again for the opportunity to provide input on the development of these responsible aquaculture standards.

Chetana Mirle, Ph.D.

Director
Humane Society International - Farm Animals

An HSI Report: Fish and Pain Perception

Stephanie Yue, Ph.D.[*]

Abstract

In several arenas—legislative, academic, corporate, advocacy, and scientific—the welfare of fish has increasingly attracted attention due in part to the expansion of the aquaculture industry, as well as the growing understanding that many handling methods, management systems, and slaughter practices can induce pain and therefore reduce animal welfare. Unlike other animals raised for human consumption, however, general consensus has not always afforded fish the presupposition that they are, in fact, capable of feeling pain. The typical arguments in support of or against attributing pain capacity to fish revolve around their neuroanatomical development, behavioral and cognitive complexity, physiology, and anatomy. After reviewing the current scientific evidence and exploring the many arguments, it is irrefutably substantiated that fish are capable of experiencing pain.

Introduction

Aquaculture, as defined by the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce, is "the propagation and rearing of aquatic organisms in controlled or selected environments for any commercial, recreational or public purpose."[1] Described as the fastest-growing food production sector in the world, aquaculture's growth is expected to continue.[2] Indeed, simply to satisfy current worldwide fish consumption, the Food and Agriculture Organization of the United Nations predicted in 2006 that worldwide aquaculture production must nearly double in the next 25 years.[3] In the last two decades, the aquaculture industry[†] has expanded approximately 8% per year, and it is expected that the number of farmed fish will continue to rise,[4] perhaps surpassing the number of wild-caught animals from the world's fisheries.

Given the scale and growth of the global aquaculture industries, increasing concern for the treatment of farmed fish has resulted in extensive scientific review of fish welfare and stress,[5,6,7,8,9,10,11,12,13,14,15,16,17] as well as debates on pain and consciousness in fish.[18,19,20,21,22,23,24,25]

[*] Dr. Yue received her Ph.D. in 2005 from the University of Guelph and served as a consulting farm animal welfare scientist for the Humane Society of the United States in 2007 and 2008..

The Function of Pain

Pain is an evolutionary adaptation that helps individuals survive, providing a signal that gives animals the opportunity to remove themselves from damaging situations, thereby increasing their chances of passing on their genetic makeup to future generations.[26] Negative experiences incentivize avoiding similar future occurrences to prevent further damage. Teleologically, pain has both survival and adaptive value.[27,28]

An extremely rare human disorder, congenital insensitivity to pain, highlights the protective benefits of pain. Sufferers experience severe tissue damage, bone fractures, and joint deformities, among other injuries, as a result of sustaining and/or not avoiding physically damaging activities and behaviors.[29]

Evolutionary evidence suggests no radical discontinuity between humans and other vertebrate animals,[30] and, as such, a trait like pain perception is not likely to suddenly disappear for one particular taxonomic class. A comparison of empirical data from human and non-human animals has shown that non-human animals begin to exhibit escape behavior at approximately the same stimuli intensity that human subjects first report pain.[31] Animal scientists have argued that the pain system should be viewed as an old evolutionary trait, not a recent one.[32,33] All emotions, including the negative emotional experience of pain, may originate from the most phylogenetically ancient part of the brain—which is reptilian—indicating fish should also have the ability to feel pain.[34] Pain perception in fish makes Darwinian and biological sense.

Pain and Nociception

According to the International Association for the Study of Pain (IASP), publisher of the scientific journal *PAIN*, pain is defined as "[a]n unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage."[35] IASP cautions that the "inability to communicate verbally does not negate the possibility that an individual is experiencing pain and is in need of appropriate pain-relieving treatment" and notes that "[p]ain is always subjective" and "is that experience we associate with actual or potential tissue damage. It is unquestionably a sensation in a part or parts of the body, but it is also always unpleasant and therefore also an emotional experience."[36] In contrast, "[a]ctivity induced in the nociceptor and nociceptive pathways by a noxious stimulus is not pain, which is always a psychological state, even though we may well appreciate that pain most often has a proximate physical cause."[37]

Simply put, pain is a negative sensory and mental experience, an emotional feeling of distress, suffering, or agony, whereas nociception is the physical, unconscious response to noxious stimuli that results in a behavioral or physiological change.[38] Consider the following example: If one were given local anesthesia before a dentist extracted a tooth, one's nociceptors—nerve fibers that produce the sensation of pain when they are stimulated by tissue-damaging or noxious stimuli—would respond to the tissue damage, yet the feeling of pain would be blocked. Physiologically, one's body would respond (e.g., inflammation), but pain would not be experienced until the anesthesia dissipated.

In humans, the conscious, negative experience is an intrinsic component of pain.[39] In fish, however, some scientists and laypersons have questioned whether it is reasonable to assume that pain can explain some of the avoidance responses by fish to various noxious stimuli, such as being hooked, netted, electrically shocked, clubbed, cut, or mutilated. That is, debate has arisen, and research undertaken, to examine the capability of fish to feel pain.

The Neuroanatomical Argument

In an interview with Gord Ellis, fishing editor of *Ontario Out of Doors Magazine*, University of Wyoming Professor of Zoology and Physiology James D. Rose reportedly said:

> It's generally agreed upon among scientists who study pain that the actual experience of pain is a psychological thing and that it's completely separate from the behavioural reactions….The key issue is the distinction between nociception and pain. A person who is anaesthetized in an operating room, or has had a bad head injury, will respond physically to external stimulation, but he or she will not feel pain. Anyone who has seen a chicken with its head cut off will know that, while its body can respond to stimuli, it cannot be feeling pain….Some fish species certainly do have nociceptive neurones similar to those found in a human. However, this means only that these animals are capable of sensing noxious stimuli; it provides no evidence for the psychological experience of pain.[40]

In 2002, Rose published "The Neurobehavioral Nature of Fishes and the Question of Awareness and Pain,"[41] a literature survey conducted at the behest of the American Fisheries Society.[42] In his paper, Rose argues that fish cannot feel pain because they do not posses the neocortex, a neuroanatomical structure that, in humans, is associated with conscious awareness. As fish do not possess a neocortex, he concludes that avoidance and pain-like behaviors exhibited by fish are mere unconscious, reflexive responses, akin to the automatic, knee-jerk response humans perform when tapped on the knee. Further, neocortically damaged humans have no consciousness, yet noxious stimulation applied to the faces of these impaired patients can evoke facial grimaces and flinches reminiscent of a person in pain, though the patients are unaware of their own reflexive responses. Similarly, Rose contends that when a fish darts away from an electric shock or the sharp teeth of a predator, for example, that avoidance behavior is not caused by pain, but rather is a behavioral response to negative stimulation—a reflexive, unconscious display of pain-like behavior.[43]

While Rose was not the first to introduce the idea of fish insentience due to a structural brain difference,[44] his 2002 paper was widely received and is currently a frequently cited reference used by those arguing against the concept of fish pain. In contrast, however, research scientists have presented counterarguments to the neuroanatomical debate, revealing fundamental flaws in Rose's reasoning.[45,46,47]

Rose's comparison of normal, healthy, fish brain anatomy to a pathological, vegetative state in humans is logically and scientifically unsound, and his assertion that the neocortex is the sole means by which pain can be experienced suggests that it is the seat of consciousness. However, a cursory review of the neurobiology of consciousness[48,49,50,51] shows both the complexity of the phenomenon of consciousness and that conscious phenomena, such as pain, are not restricted to any one location in the brain.[52] Additionally, the neocortex is unique to mammals. Were the presence of a large, considerably developed neocortex the requirement for experiencing pain, as Rose suggests, his theory would eliminate birds, amphibians, other non-mammalian animals, and even some mammals from having the capacity of feeling pain,[53] which is unfounded.[54,55,56]

An international consortium funded in part by the National Institutes of Health published a report in the February 2005 issue of *Nature Reviews Neuroscience* that found that the "brains of birds appear to be more similar to those of mammals than previously thought….Previous opinion held that the malleable behavior of mammals required the higher-order neocortex found in mammals. But collected genetic, behavioral, and molecular evidence shows that, although the structures are organized differently, areas of the avian brain perform functions similar to those of the mammalian neocortex, which is responsible for performing sensory information processing."[57] Similarly, scientific studies have shown that although fish do not possess the exact brain structures that humans do, their brains are both homologous (derived from a common ancestor) and functionally analogous (functioning in a like manner) to the mammalian brain.[58,59] For example, in teleost fish, the lateral and medial pallia are proposed to be homologous to the mammalian hippocampus (the brain region primarily responsible for memory)and amygdala (a region in forebrain and part of the limbic system involved in the production of emotional responses like fear), respectively.[60,61,62,63] Studies have found that lesions to the fish lateral pallium result in significant deficits in learning and memory, while lesions to the medial pallium disrupt avoidance learning and fear conditioning, evidence that fish possess functionally analogous brain structures to more derived vertebrate mammals.[64] Findings also indicate that some fish forebrains have functionally distinct regions and that these are homologous to some major mammalian brain structures.[65] The brains of many fishes undergo a developmentally different process from the mammalian brain in that the mammalian neural tube, the embryological structure from which the brain and spinal cord develop,[66] folds in on itself, while the teleost fish neural tube folds outward.[67] This difference in neurological development means that in comparison to the mammalian brain, the major fish forebrain structures develop in reverse order.[68] Irrespective of the placement of many of the main structures in the fish brain, their existence, most importantly, has been confirmed.

Through a variety of scientific techniques, researchers have found many similarities in neuroanatomical structure between fish and land-based vertebrates, from gross regional structures to finer neuronal structures,[69] and neurobiological evidence proposes that there is strong structural conservation throughout evolution.[70] Dunlop and Laming extended the idea of investigating brain structures and examined the central nervous system. Recordings were taken from the spinal cord, cerebellum, tectum, and telencephalon of goldfish and trout after the animals were exposed to various stimuli, including noxious pin-prods and heated prods, as well as such neutral sensory stimuli as being stroked with a paint brush. Neuronal responses were elicited in each of these regions of the central nervous system, and, as responses were detected from the spinal cord up to the telencephalon, the scientists determined the existence of an ascending nociceptive pathway. Indeed, responses confined to the dorsal root ganglion, would suggest simple reflexive nociception. However, activity in the higher brain centers, such as the telencephalon, suggest the ability of pain perception.[71] The researchers propose that the fish telencephalon may therefore be a center for processing pain information, as the neocortex does in mammals. As a primary question regarding pain perception is whether nociceptive responses are simply reflexive responses, this finding provides evidence of the awareness of pain, not merely an unconscious, physical reaction.

The Physiological Argument

Historically, lack of information pertaining to pain perception in fish, coupled with the few early studies that attempted to investigate nociception in some lesser-derived fish species, suggested that the aquatic animals did not have nociceptors and therefore were unable to experience pain.[72] This supported the belief that the concept of fish pain was both speculative and subjective.[73]

The interest in fish welfare has resulted in an expansion in fish pain research. Neville Gregory,[‡] professor at the University of London's Royal Veterinary College,[74] helped spawn the scientific inquiry into developing what he considered to be the criteria for the assessment of pain in fish:

1. to establish whether fish have the neurotransmitter, neuron types, and brain structures known to convey information about pain in mammals;
2. to expose fish to what humans would consider painful stimuli, evaluate their responses, and then determine whether these pain-like responses can be suppressed with analgesic drugs that, in turn, can be suppressed by analgesic blockers; and
3. to investigate whether fish can learn to associate aversive stimuli with neutral conditioned cues and whether the animals would then respond with appropriate avoidance behavior when exposed only to those cues, providing evidence that fish are be capable of anticipation and that avoidance responses are less likely to be governed by reflexive mechanisms stimulated only by the presence of the negative stimulus itself.[75]

With respect to the first criterion, Sneddon *et al*.'s ground-breaking study on fish pain revealed that fish do indeed possess nociceptors capable of detecting tissue-damaging stimuli such as mechanical pressure (e.g., physical force), excessive temperature (e.g., hot prod), and chemical irritation (e.g., acetic acid). (See Figure 1 below.[§]) This study not only discovered the physical location of the nociceptors on the rainbow trout's head, but also that the nociceptive nerves have some identical properties to those described in the pain system of more derived vertebrate animals. Fish nociceptors, similar to those in mammals, are linked to two categories of nerve

[‡] Dr. Gregory also serves as chair in Animal Welfare Physiology jointly supported by the Royal Veterinary College and the Biotechnology and Biological Sciences Research Council, and has authored more than 290 scientific papers
[§] Reprinted with permission. Sneddon LU, Braithwaite VA, and Gentle MJ. 2003. Do fishes have nociceptors? Evidence for the evolution of a vertebrate sensory system. Proceedings of the Royal Society of London 270(1520): 1117.

fiber that arise as free nerve endings in the skin and differ in diameter and information transmission speed. The A-delta fibers, small in diameter and myelinated, are associated with immediate or "pricking" pain, whereas the even smaller, unmyelinated C fibers are associated with dull, aching, or chronic pain. In the rainbow trout, out of the four different types of nerve fibers, A-delta and C fibers act as nociceptors: A-delta fibers comprise about 25% and are more abundant than C fibers, which comprise approximately 4%. In contrast, C fibers can compose up to 50% of all fiber types in mammals.[76,77] This proportional difference in the presence of A-delta compared with C fibers between fish and mammals is of unclear significance, but may be merely a reflection of evolutionary divergence. Nonetheless, a nociceptive system similar to the mammalian system has been found to exist in fish. Thus, fish such as trout possess the necessary neuroanatomy and neurophysiology to transduce and process information that would be regarded as painful in humans.[78]

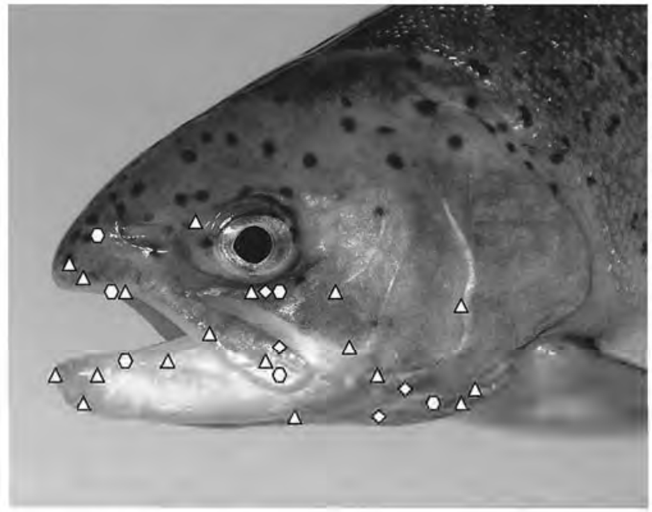


Figure 1. Position of polymodal mechanoreceptors or nociceptors, mechanothermal receptors and mechanochemical receptors on the head and face of the rainbow trout, *Oncorhynchus mykiss* (triangles, polymodal nociceptor; diamonds, mechanothermal nociceptor; hexagons, mechanochemical receptor).

Chervova *et al* addressed Gregory's second criterion in research studies conducted more than a decade ago. The scientists found that fish demonstrated strong aversive tail-flick responses to electric shock, fin pinching, and needle pricking, and that their pain-like response decreased in strength with increasing dosages of opioids and analgesics.[79,80] With respect to reversing the effects of opioid drugs, studies have shown that the delivery of naloxone, an opioid receptor blocker, reverses the analgesic effect of morphine in different species of fish.[81,82] Likewise, exogenous analgesic compounds like morphine has been shown to increase pain tolerance in fish who are subjected to painful stimuli.[83,84] These results are consistent with the fact that opioid receptors and endogenous opioids are found in the spinal cords and brains of fish.[85]

Numerous scientific studies have fulfilled the third and final criterion outlined by Gregory, determining that fish are capable of learning avoidance tasks. Many types of fish species can learn quickly to associate neutral stimuli with aversive stimuli and consequently use these cues to anticipate and therefore avoid the negative stimuli completely.[86,87,88,89]

It is well-established that fish experience chemical and physiological stress responses in a manner similar to mammals. Fish produce the same stress hormones and release them within a similar physiological pathway.[90,91] Like mammals, fish show a generalized stress reaction that can be categorized into its primary, secondary, and tertiary responses. The primary response consists of neuroendocrine responses, which include the rapid release of stress hormones such as adrenaline and cortisol. These stress hormones can then activate metabolic pathways in the secondary response phase, which can alter blood chemistry and hematology (e.g., changes in blood glucose concentration). The tertiary response reflects changes in the whole animal; examples include negative effects such as lowered immune function and decreased growth and reproductive capacity.[92] This general physiological stress response is almost identical to that found in the mammalian system.[93]

Indeed, non-human animals, with their similar underlying physiology, have been used in psychopharmacological studies investigating emotional states and predicated upon the assumption that the animals used are sentient individuals able to experience feelings like pain, anxiety, and fear, similarly to human beings.[94] Studies of broiler chickens suffering from leg problems have shown that they will preferentially choose diets laden with analgesics,[95] indicating that the birds were attempting to alleviate their leg pain, and studies of rats have shown that they will self-administer pychostimulant drugs like amphetamine, cocaine, morphine, and heroin after having experienced them before.[96,97,98,99,100] Similarly, fish have been used in studies that investigate the hedonic effects of addictive drugs. Having similar dopaminergic pathways to mammals, research has shown that fish will seek out the effects of cocaine after initial exposure to the drug.[101]

In fish, as in mammals, dopaminergic cell bodies and Substance P terminals are found in the nervous system.[102,103,104] Substance P is a peptide neurotransmitter that modulates pain sensitivity by activating the neurokinin-1 (NK-1) receptor, which is expressed by groups of neurons throughout the central nervous system. The Substance P peptide is produced by small-diameter sensory pain fibers and is released into the dorsal horn of the spinal cord following noxious peripheral stimulation, promoting an increased sensitivity to pain.[105] Substance P, which is associated with pain transmission, has been found in the central nervous system of fish, with the highest concentrations found in the hypothalamus and forebrain.[106] The similar pain pathways and biochemical mediation of nociception are in many ways similar to those of land-based vertebrates, suggesting the capability of pain perception.[107] As such, it follows that fish show pain responses in nociceptive behavioral tests much as mammals do. The convincing body of physiological evidence shows that fish do have the ability for subjective experiences such as pain.

The Behavioral Argument

Traditionally, fish have been viewed by some as simplistic animals[108]—unintelligent and with a limited behavioral repertoire and severely compromised memory—leading to the discounting of their ability to feel pain. In reality, however, fish are neither behaviorally deficient nor cognitively impaired. Fish do not have the ability to make facial expressions and, relative to mammalian animals, have a limited ability for postural changes and vocalizations. Therefore they do not exhibit familiar mammalian responses such as screaming, crying, whimpering, flattening their ears, tucking their tails between their legs, or raising their hackles when threatened. Fish react to threatening or stressful stimuli in more subtle ways such as color changes,[109,110,111] alterations to their level of movement by swimming rapidly or becoming immobile,[112,113] and water column utilization by swimming in the upper, middle, or bottom depths of the water.[114,115] Cautioned Michael Stoskopf, Professor of Aquatics, Wildlife, and Zoologic Medicine and of Molecular and Environmental Toxicology at North Carolina University, "It would be an unjustified error to assume that fish do not perceive pain in these situations merely because their responses do not match those traditionally seen in mammals subjected to chronic pain…."[116] Indeed, even a cursory scientific literature search reveals an abundance of data devoted to behavioral and cognitive study of fish.[117,118,119]

In one such study, pain perception in goldfish and rainbow trout was investigated by using flexible learning ability. Researchers used spatially cued behavioral responses of the fish to noxious stimuli. Individual fish were placed into a test tank, and, whenever an animal swam into a particular region of the tank, electric shocks of low or high intensities were administered to the skin where nociceptors are known to be located. In response to the electric shocks, both species of fish showed escape and avoidance behaviors, such as becoming immobile and erratic, high-speed "panic" swimming, and eventually learned to avoid the electrified areas. The scientists found that this escape and avoidance behavior changed significantly when a conspecific, a fish of the same species, was put into the tank with them. Rather than avoiding the zone where low-shock intensity was delivered, rainbow trout elected to stay in the electrified area for the opportunity to be near a conspecific. In contrast, goldfish were unwilling to spend time either in the low- or high-electrical stimulating zones in order to be near a conspecific, despite having spent a significant amount of time in these zones during periods of non-stimulation. The researchers explained this difference in behavior as illustrating the difference in social habits of the two species: Goldfish are not truly social animals, whereas trout may have a need for shoaling (swimming in a synchronous group), particularly during threatening situations. The findings of this study show that painful shock avoidance in fish is not purely a reflex response; fish have purposeful control over their own behavior.[120]

The behavioral component of Sneddon *et al.*'s nociceptor study also suggests that the trout's behavioral responses to noxious stimulation are modulated by higher cognitive function. The researchers designed a feeding experiment to quantify the animals' level of motivation to eat after undergoing presumably painful treatments.[121] Motivational states are often considered to be affective states (those that describe an animal's mental state or mood),[122] and changes in emotional state result in changes in cognitive processing and behavior.[123,124] To investigate how pain affects motivational states, the scientists put trout in tanks containing a food-dispensing apparatus. Before the experiment began, fish were trained to swim to the dispenser to retrieve food pellets upon a light cue. Once fish had learned this task, they were divided into four groups: The fish in one group received no treatment, those in the second group had their mouths injected with saline, the third had their lips injected with acetic acid solution, and the animals in the fourth group were given bee venom. Acetic acid solution and bee venom are known to cause inflammation and irritation in mammals, and constituted the noxious treatments. When given the chance to feed upon light cue again, the trout treated with the noxious stimuli showed significantly prolonged suppression to regain feeding behavior compared to the control groups. The researchers also noticed dramatically increased opercula beat rates (gill or ventilation rates), which indicated physiological stress.[125] Abnormal behaviors were observed as well. Fish in the two noxiously treated groups rocked from side to side on their pectoral fins while resting on substrate, indicating a negative emotional response or discomfort.[126,127] Fish whose lips were treated with acetic acid were also observed rubbing their snouts against tank walls and bottom substrate. These behaviors were not seen in the two control groups. The researchers interpreted these results as a reflection of not only underlying changes in physiology, but also the demonstration of the experience of pain.[128]

In another behavioral study, Sneddon *et al.* investigated the interaction of avoidance behavior and fear to better understand the phenomenon of pain perception in fish. It is known that trout are typically neophobic, showing fearful avoidance behavior towards novel objects, and either stay away from or require a significant amount of time to approach an unknown object. Sneddon *et al*. investigated the trout's attentional state by placing a novel object, in this case a brightly colored plastic object, into the holding tanks and comparing the avoidance responses of control fish who had been injected in the snout with innocuous saline and test fish who had been injected in the snout with noxious acetic acid. While the control group avoided the novel object, thereby behaving as expected given trout's neophobia, the test fish treated with the noxious acid spent more time closer to the plastic object. The researchers explained this difference in behavior as an impairment of attentional state or avoidance behavior by the test fish due to their distractions caused by the experience of noxious stimulation, or pain.[129]

This theory begged the question as to what would happen if the fish were given an analgesic. The researchers were able to show that the attentional deficit was reversed with intramuscular injection of morphine sulfate, a pain reliever. That is, once the test fish who had been injected with noxious acetic acid received an analgesic, both the control and test groups demonstrated comparable levels of avoidance behavior towards the novel object. Sneddon's team suggested that the provision of analgesia reduced pain, which therefore reinstated attention and fear toward the novel object and thereby diminished the impairment of the avoidance response in the test fish.[130] Very similar results have been seen in the human scientific literature, as it is known that pain can interfere with cognitive tasks. For example, patients suffering from painful fibromyalgia can suffer from concentration and memory deficits.[131] Sneddon *et al.* concluded that their results, along with the growing body of literature in fish welfare, provide sufficient evidence to show the fulfillment of criteria for animal pain, at a minimum with regard to rainbow trout.[132]

Conclusion

On the basis of scientific evidence, fish have the capacity for experiencing and feeling pain. In a review of fish nociception and pain, Sneddon followed a set of pain criteria developed by Patrick Bateson, emeritus professor of ethology at the University of Cambridge and president of the Zoological Society of London,[133] and successfully determined multiple scientific examples from fish data that fulfilled each requirement,[134,135,136] similar to the way in which Gregory's criteria for pain have been addressed.[137]

Indeed, the typical arguments against fish pain perception are easily refutable. For some time, a challenge in understanding non-human animals' emotions and behaviors was steeped in our inability to communicate verbally with them, thereby making the lack of common language a primary barrier. However, behavioral tests have allowed animals to express their perceptions, preferences, aversions, and prioritization of desires. This enables conscious experiences to be accessible for scientific investigation.[138] Said Marion Stamp Dawkins, Professor of Animal Behavior at the University of Oxford and Vice-Principal of Somerville College, behavioral tests allow animals to "vote with their feet"[139] or, in this case, with their fins.

Ample behavioral, physiological, neurobiological, and pharmacological evidence exists to support the thesis that fish are capable of suffering from pain.[140,141] Posited Gregory, "The appropriate question appears not to be *do fish feel pain*? but rather, *what types of pain do fish experience?*"[142]

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An HSUS Report: The Welfare of Animals in the Aquaculture Industry

Abstract

In the United States, approximately 1.3 billion fish are raised in off-shore and land-based aquaculture systems each year for food, making them the second-most commonly farmed animal domestically, following broiler chickens. The majority of farmed fish are subject to overcrowded and restrictive conditions, which, if unchecked, can quickly deteriorate water quality, cause severe stress, and result in increased mortality. Aquaculture practices and production—including handling, grading, transport, genetic manipulation, aggression from conspecifics, predation, physiological stress, and inhumane slaughter—compromise the welfare of these animals.

Introduction

If fisheries sustain their current yields, populations of wild-caught aquatic animals face uncertain futures, with predictions of global collapse by 2048 of all species currently fished.[1] "The wild harvest of seafood, man's last major hunting and gathering activity, is at a critical point," wrote U.S. Department of Agriculture (USDA) researcher David Harvey. "Technology has enabled harvesting to outpace the speed at which species can reproduce."[2]

According to the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, the human population of 6.09 billion in 2000 is estimated to reach 8.2 billion by 2030.[3] Globally, the average per-capita fish and shellfish consumption each year from 2001 to 2003 was 16.4 kg (36.2 lbs)[4] and is predicted to increase to 22.5 kg (49.6 lbs) by 2030.[5] Indeed, given that consumption has outpaced the growth of the world's human population since the 1960s,[6] the world's fisheries are unlikely to satisfy the marketplace. "In response," continued Harvey, "the seafood industry is beginning to shift from wild harvest to aquaculture, the production of aquatic plants and animals under grower-controlled conditions."[2]

Absent the additional demands placed on fish supply by the increasing human population, the Food and Agriculture Organization (FAO) of the United Nations predicted in 2006 that worldwide aquaculture[*] production must nearly double in the next 25 years to satisfy current worldwide consumptive patterns for fish.[7] Since the mid-1980s, the aquaculture industry has expanded approximately 8% per year,[7] and the numbers of farmed fish are expected to continue to increase, perhaps surpassing the numbers of wild-caught animals from the world's fisheries. Tore Håstein of Norway's National Veterinary Institute addressed the World Organisation for Animal Health (OIE) Global Conference on Animal Welfare in 2004 and reported that aquaculture has "developed to become the fastest growing food production sector in the world and it will continue to grow in the years to come."[8]

With the expansion of the fish farming industry comes growing concern for the well-being of increasing numbers of aquatic animals raised and killed for human consumption.[8] A review of recent scientific literature on fish welfare[8-17] and stress,[18-22] as well as debates on pain and consciousness in fish,[23-30] reflect the escalating interest in the well-being of farm-raised fish. This area of research was considered so important that both

[*] For the purpose of this report, "aquaculture," "aquaculture production," and "aquaculture industry" refer exclusively to the farming of fish, not aquatic plants and other aquatic animals.

Diseases of Aquatic Organisms[31] and *Applied Animal Behaviour Science*[32] devoted entire issues to the subject of behavior and welfare of fish. Beyond the scientific community, concern for fish welfare is also receiving attention, including amongst industry. The Fisheries Society of the British Isles (FSBI) states: "In practical terms also, it is often in our selfish interest to consider the issue of animal welfare; for example…poor welfare of farmed fish often equates to poor production."[9]

With the expected growth of the human population and increased per-capita fish consumption, the aquaculture industry will likely continue to experience growth. It is therefore critical that producers act now to develop methods to ensure the health and welfare of the increasing numbers of farmed fish.

U.S. Aquaculture Industry Overview

According to the USDA's Census of Aquaculture completed in 2005, nearly 1.3 billion fish were raised for human consumption annually, with the industry dominated by five species: catfish (or channel catfish, 83.4% of cultured "food fish" by numbers), trout (11.9%), tilapia (2.8%), bass (1.3%), and salmon (0.5%).[33] The total sales value of aquaculture for food was $672 million that Census year, with the top three states accounting for 40% of the number of U.S. facilities and nearly 64% of the total sales.[33]

Top Ten U.S. States for Food Fish Aquaculture Production[33]

Rank	Number of farms	Value of sales
1	Mississippi	Mississippi
2	Alabama	Alabama
3	Arkansas	Arkansas
4	North Carolina	Idaho
5	Wisconsin	California
6	California	Washington
7	Georgia	North Carolina
8	Texas	Texas
9	Florida	Pennsylvania
10	Pennsylvania	Missouri

Across a variety of species, the steps and methods of aquaculture production are principally the same.[34-38] To obtain young, two primary systems are employed: 1) eggs and milt, a sperm-containing secretion of the testes of fish, are hand-collected from broodstock and mixed to induce fertilization or 2) broodstock spawn in captivity and fertilized eggs or swimming fry (young, post-larval fish) are subsequently collected. When starting with fertilized eggs, they are incubated until hatched. When fry begin actively searching for food, they are collected and transferred to a nursery to grow and feed until a preset time, size, or mass is reached: perhaps 2-3 months for tilapia,[34] 4-6 months for catfish[35] and trout,[36] 6-8 months for bass,[38] and 8-16 months for salmon.[37] Next, the fish are transferred from the nursery to a grow-out facility where they remain until reaching market size: 5-6 months for tilpia,[34] 15-18 months for catfish,[39] 15-20 months for trout,[36] 18-24 months for bass,[40] and 18-36 months for salmon.[37] Times for all species can vary widely by many months depending on water temperature and quality, feed quality and availability, and stocking density.[39-41]

The facilities most commonly used for aquaculture production are ponds, tanks, raceways, cages, and pens. Ponds can be natural or artificial, typically with low water refreshment. Tanks are often fiberglass with a high water turnover rate. Raceways are long, linear structures designed so water flows into one end and out the other with high turnover. Cages or pens are usually made from mesh or net screens and are submerged in larger bodies of water, often lakes or seas for species requiring saltwater.[42] The production of many farmed species requires the use of different types of facilities at different points in their lives. Farmed salmon, for example, hatch and grow as juveniles in freshwater, but after physiological adaptation to marine life, or smolting, grow-out is in seawater.

Collection of farmed fish is typically performed by netting, grading (a process similar to netting but using grates of various widths that allow fish below market size to pass through), or the draining of ponds. The animals are then transported to processing facilities for slaughter and packaging.

Given the scale of the U.S. and global aquaculture industries, and increasing concern for the welfare of farmed fish, several aspects of fish farming production practices and their impacts on the well-being of aquatic animals must be addressed.

Pain Perception and Consciousness

Despite the current body of evidence regarding the welfare of farmed fish, some arguments persist that their ability to suffer and their conscious awareness of stimuli are yet to be determined. As such, two conflicting positions exist: one that contends that fish have the mental capacity to suffer and feel pain[26,27,43] and another that asserts that fish brains lack a key neuroanatomical structure, the neocortex—which, in humans, is associated with the generation of conscious, subjective states—so, the animals have no consciousness or capacity to feel pain.[25]

On reviewing the evidence for nociception, or the ability to perceive and transmit signals of noxious stimuli, scientists are in agreement that fish have both the appropriate nerves and pathways to sense and send potentially painful signals[8,15,23,24] and that fish share neurotransmitters responsible for pain transmission with mammals,[44] which are found in higher concentrations in brain regions receiving input from these nerves.[24] Håstein concludes, "It is beyond doubt that fish do have nosiceptors [*sic*] and thus have the possibility to register pain, although the response and way of 'showing' pain is not expressed the same way as in terrestrial animals."[8]

Lynne U. Sneddon of the University of Liverpool's School of Biological Sciences and her co-authors believe that showing physiological and behavioral responses to painful stimuli are suggestive of the perception of pain in fish.[23] Investigating the effects of noxious substances injected into the lips of trout, the researchers observed significant changes in physiology and behavior, including increased gill, or opercular, beat rate and time to resume feeding.[23] Sneddon *et al.* also reported that the fish, after being injected in their lips, rubbed their mouths against the sides of the tank and the gravel, and displayed rocking behaviors for up to 90 minutes post-injection—behaviors she feels are not simple reflexes and that were mitigated by application of an analgesic.[23,45] The scientists concluded: "If a noxious event has sufficiently adverse effects on behaviour and physiology in an animal and this experience is painful in humans, then it is likely to be painful in the animal."[23]

Arguing against the idea that fish have the ability to suffer and feel pain, James D. Rose, a professor in the Department of Zoology and Physiology at the University of Wyoming, stresses that fish lack a neo-cortex, which he contends is essential for consciousness. Though he agrees that noxious stimuli can evoke neural activity leading to physiological stress and behavioral responses, and further acknowledges that nociceptive reactions are universal in the animal kingdom, Rose distinguishes this from sentience stating that "reactivity to noxious stimuli does not imply conscious awareness."[25] His primary argument distinguishes between behavioral responses to potentially painful stimuli and conscious, painful experiences where "functions of specific regions of cerebral cortex" allow humans to be aware of pain.[25]

Among vertebrates, however, there are differences in brain areas with specific functions.[10,24] In his essay "The Evolution of Pain," Donald Broom, University of Cambridge Professor of Animal Welfare in the Department of Clinical Veterinary Medicine and Vice-Chair of Animal Welfare for the European Commission's Scientific Committee on Animal Health and Animal Welfare, cautions: "It is necessary to look for the site of any particular function rather than assuming that it will be in the same area as in man" and concludes that "it is not logical to assume that, because an area which has a certain function in man is small or absent in another group of vertebrates, the function itself is missing."[24] Evidence for the existence of nociception has been found in all vertebrates investigated, and, within the species researched, more similarities than differences exist in nociception systems, leading Broom to suggest that not only is there no basis for pain being more important for those with elevated cognitive capacity, but that "[p]ain might be a greater problem in animals with less cognitive ability."[24]

Kristopher Chandroo, a veterinarian from The University of Guelph's Aquaculture Centre, and co-authors assert that absence of structural similarities to humans in the fish brain does not exclude possible functional similarities.[27] In fact, emotions require "relatively primitive brain circuits that are conserved through evolution."[26] The researchers conclude: "Anatomical, pharmacological and behavioural data suggest that affective states of pain, fear and stress are likely to be experienced by fish in similar ways as in tetrapods. This implies that fish have the capacity to suffer, and that welfare consideration for farmed fish should take these states into account. We suggest that the concept of animal welfare can be applied legitimately to fish. It is therefore appropriate to recognize and study the welfare of farmed fish."[26]

Separate from the debate on consciousness, the complex behaviors of fish, including deliberate avoidance responses and fear,[46] indicate more than simple reflex.[17] For example, carp, after having been hooked once, learn to avoid bait for a year or more,[47] and salmon can learn predator-avoidance skills from experienced fish.[48] Additionally, fish are able to learn about and remember their environment to aid in orientation and navigation,[49] solve tasks based on mental images of their surroundings,[50] and learn from familiar conspecifics, implicating the importance of social groups.[51] After reviewing evidence documenting complex behaviors exhibited by fish, Felicity Huntingford, Professor of Functional Ecology in the Department of Environmental and Evolutionary Biology at the University of Glasgow, and co-authors conclude that "the experience of suffering may be a real possibility."[10]

John Webster, University of Bristol emeritus professor of Animal Husbandry and founding member of the Farm Animal Welfare Council, an independent advisory body established by the British government in 1979 "to keep under review the welfare of farm animals on agricultural land, at market, in transit and at the place of slaughter; and to advise the Government of any legislative or other changes that may be necessary,"[52] synthesized the discussion in a 2005 interview with *The Daily Telegraph*: "A powerful portfolio of physiological and behavioural evidence now exists to support the case that fish feel pain and that this feeling matters. In the face of such evidence, any argument to the contrary based on the claim that fish 'do not have the right sort of brain' can no longer be called scientific. It is just obstinate."[53]

The Welfare of Aquaculture Animals

Given the myriad and fundamental differences between farmed fish and other animals raised for human consumption, it follows that welfare considerations common to land-based farmed animals may not be directly applicable to aquatic farmed animals.[9] Contributing greater complexity to the farmed fish welfare discussion are the challenges of separating the different effects of individual production factors, leading to, as Huntingford *et al.* put it, "the important conclusion that, even for a particular species, gender and age of fish, we cannot guarantee the welfare by defining a simple set of husbandry conditions. This in turn emphasizes the need for sensitive on-the-spot indicators of welfare."[10]

The FSBI, the "premier Society in the British Isles, and increasingly in Europe, catering for the interests of professional fish biologists and fisheries managers"[54] and publisher of *The Journal of Fish Biology*, identifies several directly observable indices of welfare, including:[9]

- changes in skin or eye color, often indicating exposure to adverse events;
- changes in ventilation rate observed as increased opercular beating, indicating stress or exposure to environmental contaminants;
- changes in swimming performance and other behaviors, indicating injuries, the presence of parasites, or generally decreased welfare;

- reduced food intake, often indicating acute or chronic stress;
- loss of body condition or impaired growth, indicating possible chronic stress;
- morphological abnormalities resulting from the effects of adverse conditions on development;
- occurrence of injuries from aggression and slow healing, indicating possible poor immune response; and
- increased incidence of disease, indicating possible poor environmental conditions.

To align welfare issues with those commonly considered for land animals, several scientists have adapted the Brambell Committee's "Five Freedoms" to fish,[10,55] summarized as follows:

1. Freedom from hunger and thirst: Captive fish should have a nutritionally appropriate diet to avoid decreased welfare; smolting fish may become dehydrated if transferred to sea water at too young of an age, before they are able to survive.
2. Freedom from discomfort: Appropriate water conditions should be provided as fish, through the surface area of their gills, are in intimate contact with their environment. Factors to be considered include levels of dissolved oxygen, pH, and ammonia; temperature; flow rates; and the presence of pollutants.
3. Freedom from pain, injury, and disease: While many diseases of fish may be poorly understood, they are frequently caused by problems with the environment. When outbreaks occur, they can lead to high mortality rates. All attempts should be made to limit disease outbreaks, and when disease is found, it should be quickly diagnosed and treated.
4. Freedom to express normal behavior: Appropriate densities and environmental conditions to enable the fish to exhibit natural behaviors should be maintained throughout the life cycle.
5. Freedom from fear and distress: Factors that cause fear, distress, discomfort, and other welfare-impairing conditions should be minimized.

Fish reared in aquaculture systems face numerous welfare challenges. The development, implementation, and management of appropriate production practices and facilities to ensure the well-being of growing numbers of farmed fish are critical, as significant concerns with stress responses, water and environmental quality, stocking densities, disease and parasites, selective breeding, genetic selection and transgenic manipulation, nutrition and feed, external impacts, crowding, handling, netting and grading, transport, and stunning and slaughter contribute to decreased welfare.

Stress Response

Fish respond to challenges, or stressors, through their stress response. According to Thomas Schwedler, Professor in the Department of Biological Sciences at Clemson University, and Sterling Johnson, Fish Disease Specialist in the Department of Wildlife and Fisheries Science at Texas A & M University, this combined physiological and behavioral response by fish to stressful conditions is a survival mechanism in which the animals may "sacrifice long-term survival strategies to concentrate their efforts on short-term survival."[13] The stress responses can be short- or long-term and may indicate poor welfare. As welfare analysis is complex and no simple link exists between stress and welfare, the FSBI warn, "there is cause for concern about the welfare of the fish involved"[9] in the presence of a coordinated stress response influenced by specific conditions. Huntingford *et al*. address this topic in their review:[10]

> Where fish cannot escape a stressor, or where the stressful stimulus is episodic or intermittent, prolonged activation of the stress response has deleterious consequences. These include loss of appetite, impaired growth and muscle wasting, immunosuppression and suppressed reproduction. Clearly, observing such changes provides strong indications that the well-being of the fish has been significantly compromised.

The stress response in fish is very similar to responses in higher vertebrates and mammals, and is often divided into three categories: primary, secondary, and tertiary stress responses.[9,56-58]

Primary stress response is characterized by the physiological changes that occur in and between the nervous system and endocrine system. The stressor is perceived and then stimulates the release of hormones (catecholamines and cortisol) from endocrine glands. Review articles detail this chain of events in its entirety.[9,10,19,56,57] It is noteworthy that the end result is the production and release of the primary stress-induced hormone, cortisol.[57]

Secondary stress responses are those triggered by the elevated levels of hormones from the primary response. These effects include: changes in rates of turnover and secretion of other hormones and neurotransmitters; increased heart rate and blood flow to gills, improving respiratory capacity; and increased energy mobilization from stored reserves.[9,56]

Tertiary responses, or whole body responses, are typically due to repeated or long-term stressors that cannot be avoided. These effects include changes in immune function, disease resistance, growth, and reproductive health.[9] Cortisol, the primary stress-induced hormone produced and released, can suppress the immune system and increase mortality as a result.[10] Behavioral modifications may also develop as a result of stress, and these changes can develop immediately with the stressor and may be prolonged after its removal. Such altered behaviors include: feeding and appetite reduction, leading to impaired growth and fitness;[59] changes in levels of activity and swimming performance; shelter seeking; suppressed predator and stressor avoidance; and difficulties with thermoregulation and orientation.[11,18,19]

Following a stressful event, the level of plasma cortisol increases, typically proportionally to the duration and magnitude of the stressor.[9,59] If the stressful event is brief, the concentration normalizes within a few hours. When faced with chronic stress, the fish's elevated cortisol levels may persist throughout the duration of the stressor.[10] Cortisol therefore provides a measure of the deleterious effects of stress.[20] These stress responses can also be cumulative if confronted with multiple stressors.[59]

Though stress cannot be directly quantified, cortisol level measurements can be used as a proxy even though measurement methods are not consistently accurate or practical, and will not necessarily implicate the stressor involved. FSBI's aforementioned directly observable indices of welfare have also been identified by Huntingford *et al.* to assess stress, health, and welfare of farm-raised fish.[9,10] A priority of the aquaculture industry should be to identify how conditions could be improved to minimize stressors and their effects to improve the welfare of farmed fish.

Water and Environmental Quality

Water quality is considered one of the most important factors contributing to fish health and is therefore seen by industry as a limiting factor in production.[60] A fish's gills have a very large surface area so they can more easily extract oxygen from water, which also makes the animals highly sensitive to pollution and poor water quality.[9] Since fish are in such intimate contact with their environment, optimal conditions for health and welfare should include appropriate temperature, dissolved oxygen (DO), pH, salinity, the levels of organic and inorganic substances, light, among other parameters.[15] According to a 2005 review, "Science-Based Assessment of Welfare: Aquatic Animals," published in the OIE's Animal Welfare: Global Issues, Trends and Challenges, failure to provide ideal environments "may result in stress, distress, impaired health and mortality, all of which are often associated with the intensive rearing conditions that cause poor water quality."[15]

The issue of water quality affects all types of production systems. Extensive and intensive systems are differentiated in part by how the water is managed. In extensive systems, natural processes maintain water quality through currents or tides, remove carbon dioxide and ammonia via microbial activity, supply DO from the atmosphere, and dilute wastes.[11,14] Once the water can no longer negotiate the rates of oxygen consumption and waste production by the fish, it must be pumped through the system via raceways, recycled in tanks, or otherwise altered to maintain good quality; the system is then deemed intensive.[11] Net pens open to the environment are typically classified as intensive because of the stocking densities involved and the requirement of extra-environmental delivered feed.[61] In either system, however, failure to provide and maintain high water quality can rapidly deteriorate fish welfare. To avoid extreme problems with water quality, it is recommended by University of California-Davis aquaculture specialist Fred S. Conte that producers avoid operating at maximum capacity as detrimental conditions can develop rapidly in high-density intensive systems.[11]

Analysis and adjustment of water quality can improve the welfare of farmed fish. Generally, water quality deteriorates in part due to interactions between fish and water, namely respiration rates and waste production. Respiration decreases the DO content and increases carbon dioxide, and fish wastes increase levels of ammonia, nitrate, nitrite, and suspended solids.[19,60] Accumulation of nitrite in the water can alter respiration by decreasing the blood's ability to transport oxygen.[11] Hypoxia and low levels of DO trigger a stress response in fish, and altered levels of other chemicals, including ammonia and carbon dioxide, can disturb fish physiology, causing impaired gill and kidney function, and may increase respiration, which can exacerbate the effects of toxicity.[14,19,60,62] Sublethal conditions, if left for long durations, will chronically stress fish and result in reduced growth and reproductive performance, and increased susceptibility to disease and parasites.[15,60] As such, it is critical to strive for conditions that are optimal, rather than simply those that do not exceed preset toxicity limits even though such limits may be easier to assess.[14,60] Optimal water conditions can vary depending on the species, age, and size of the animals, as well as their history of exposure to dissolved gases and chemicals.[14]

As a fish's body temperature is typically within a few degrees of the water temperature, any temperature increase will increase the animal's metabolic rates and demand for oxygen.[62] Water temperature conditions for farmed fish must therefore be closely monitored.[60] Staying within the optimal temperature range for a particular species and, more specifically, for genetic lines within the same species, is vital, but stress can be induced in fish when water temperature shifts dramatically even within ideal parameters.[19] This can occur when fish move in temperature-stratified waters or, if during transport, fish are moved through different environments at varying temperatures. When water temperatures increase, oxygen levels must be closely monitored as DO capacity is inversely proportional to temperature. As such, it is believed that the stress associated with increasing temperatures is due to hypoxia.[19] At the other extreme, stress induced by lower temperatures can suppress the immune system and reduce feeding, which may both be deleterious to fish welfare.[19,22]

Lighting is another environmental factor that can affect the welfare of farmed fish. Artificial lighting is used to control the photoperiod, extending daylight hours to increase growth and also to manipulate maturation.[63,64] Growth of immature fish is preferred since carcass quality degrades after sexual maturity is reached.[65,66] Aquaculture systems employ various lighting regimens, with some subjecting fish to continuous light to stimulate growth.[64,67,68] Rapid shifts in light intensity should be avoided as they can dramatically alter behavior by invoking a panic or predator type response, increasing injury through unintentional collisions, and causing mortality.[8,69] Few studies have investigated the effects on animal welfare from artificial lighting regimens, though it has been noted that artificial photoperiods can affect the immune system and disease susceptibility in some fish.[70] According to Schwedler and Johnson, fish "may require the regulation of light intensities and daily light/darkness regimes to avoid stress."[13] The FSBI lists "[a]ppropriate seasonal and daily patterns of light intensity" as "[c]ritical for fish welfare."[9] More study is needed in this area to elucidate the welfare effects of altered photoperiods and continuous lighting on farmed fish.

Stocking Density

Not unlike other industrial farm animal production systems, aquaculture facilities have increasingly stocked greater numbers of fish without making parallel increases in the size of the confinement systems. Keeping fish at high densities can have a negative impact on their health and welfare.[15,71]

Densities vary by species, age, and rearing conditions. Appropriate stocking densities should provide adequate space for proper metabolic considerations through good water quality, proper behavioral considerations, such as allowing for unimpaired swimming and social behaviors, and the limitation or control of aggression.[13,14]

Carrying capacity is a density concept that describes the ability of the system to continuously provide consistent water quality. Practically, the carrying capacity of the production system is the maximum number of fish the system can maintain in terms of management of DO, ammonia, carbon dioxide, and other water quality issues.[11,72] The appropriateness of this measure of density is questionable as it only accounts for the physiological needs of the fish and ignores spatial and behavioral requirements. As such, carrying capacity may not be optimal for disease control or welfare.[11]

Aside from the effects of high stocking densities on water quality, elevated densities can diminish the ability of fish to display natural behaviors, while increasing the exhibition of undesired ones. Given the wide variety of behaviors demonstrated by and within species at different stages in the life cycles of fish, developing a concise and broad-brushed means by which to afford aquatic animals the full range of critical natural behaviors is challenging.[19] Indeed, social behaviors vary across a wide spectrum of interactions. For example, in salmon, these behaviors change with age: Young salmon still residing in freshwater streams are solitary and will protect their feeding territory; as salmon age and begin making their migration to sea, they become more social and may begin shoaling; and, when sexually maturing, they can become aggressive.[19,73] Fish who are forced into undesired social situations face unwanted stress and diminished welfare, including higher mortality and decreased health, physiological condition, food conversion, and growth.[14] Additionally, these interactions can inhibit the ability of fish to cope with other stressors.[74]

Research has shown that the mortality of young salmon increases with density, and it is believed that social stress is a contributing factor.[75] Elevated densities have been linked with decreased disease resistance,[76] perhaps because chronic stress from aggression has been implicated in impairing immune function.[14] Aggressive interactions between fish are often based on the animals' sizes and can lead to fin, tail, and eye nipping (often referred to as cannibalism), injury from ramming, and suppressed growth.[14,77] Differences in sizes are amplified by larger fish dominating food supplies, thus growing larger, resulting in subordinate smaller fish growing slower due to competition for food at guarded feeders and higher energy requirements caused by chronic stress.[14] Indeed, high stocking densities that fail to meet behavioral requirements can stress fish and may lead to reduced growth and increased mortality.[9,11,14] Lesions that develop from aggressive behaviors can further increase the risk of infection.[8,15] Few alternatives exist for subordinate fish to avoid dominant individuals, as the confinement of aquaculture systems does not easily allow for conflict avoidance by escape.[14]

Some evidence exists that in certain species, such as tilapia and salmon, aggressive behaviors can be diminished by increasing fish densities.[14] However, it is not clear that the overall welfare of these species is improved at higher densities. As well, other welfare issues may develop at higher stocking densities such as increased bodily abrasion leading to fin damage.[12,78]

Given the complexity of stocking density issues and their effects on fish welfare for a variety of species, Tom Pottinger, Aquatic Ecotoxicology and Physiology Group Leader, and Alan Pickering, retired Professor, both with the U.K.'s Natural Environment Research Council's Centre for Ecology & Hydrology, suggest that "the aquaculture environment is inherently unsuitable for fish that are territorial or solitary animals in their natural environment, such as some salmonid fish. In these cases, agonistic interactions can be particularly stressful to the fish."[20] More investigation is needed on space (volume) preference to fully explore and address the many problems of inappropriate densities on the welfare of farmed fish.[11,79]

Disease and Parasites

A key welfare problem for farmed fish is infection by disease and parasites. In the U.S. catfish industry—the largest sector of domestic aquaculture comprising 85.8% of fish raised in 2005, farming more than 1.1 billion animals[33]—mortality due to infectious disease can approach 30% of the population.[80] Since stress can decrease immune function, high rates of disease are often warning signs of preexisting and unobserved welfare problems.[9]

The physiological links between stress and immunosuppression are thoroughly described in the aquaculture literature.[9,14,56,59] The increased levels of cortisol are implicated in the diminished capacity for macrophages (a type of white blood cell) to capture, engulf, and destroy bacteria.[14,56]Stress also decreases the numbers of white blood cells and impairs antibody production.[14,21,59,81] It has also been noted that an immune response can influence the stress response since chemicals and cells linked with immune function can affect the release of stress hormones and intermediaries,[956] leading to the possible increased susceptibility of diseased fish to other pathogens.[19] According to Gary Wedemeyer, emeritus senior scientist with the U.S. Fish and Wildlife Service's National Fisheries Research Center, "immunosuppression is particularly important because its effects can linger for some time after the other physiological changes have returned to prestress levels."[14]

Other factors aside from stress have been linked to disease.[*] In intensive aquaculture systems, poor water quality can lead to injuries in the gills, increasing susceptibility to bacterial infection.[14] This bacterial growth hinders the ability for the gills to exchange oxygen and carbon dioxide, and can be fatal.[14] Stressful water and environmental conditions, such as having inappropriate DO levels or stocking densities, are also correlated with two types of blood infections, furunculosis and motile *Aeromonas* septicemia (MAS), though proper management of rearing conditions can mitigate these outbreaks.[14] Unsuitable temperatures have also been shown to put catfish at high risk for enteric septicemia and rainbow trout at high risk for enteric red-mouth.[14] When MAS is present in the water, stress from social encounters between trout can be sufficient to result in MAS in defeated individuals.[82]

Several disorders have been identified in farmed salmon, the most studied aquacultured species. Compared to their wild counterparts, reduced exercise and food surplus for pen-confined salmon have been implicated in heart deformities that lead to poor circulation, reduced stress tolerance, and increased mortality.[8,83] Cataracts are another common welfare problem in farmed salmon, believed to be caused by water temperature fluctuations, poor nutrition, rapid growth, and exposure to UV and sunlight that can lead to reduced vision, blindness, surface lesions, and impaired growth.[8,84,85] Skeletal deformities, such as shortened vertebral columns and humped backs, are increasingly identified in farmed salmon and can lead to impaired swimming performance, diminished feeding efficiency, lower stress tolerance, and overall poor welfare.[12,86]

Farmed fish are also subject to a variety of parasitic infestations.[87,88] For certain parasites, a minimum stocking density is typically needed before infestation can occur. However, Professor Christina Sommerville, Dean of Faculty of Natural Sciences and head of Parasitology at the University of Stirling's Institute of Aquaculture, notes that this threshold "is far exceeded in the fish farm environment."[87] Parasites are known to infect nearly every part of their host; they feed on scales and can infect the blood, intestines, and nearly every other organ. If left uncontrolled, parasites can cause serious health and welfare problems and increase mortality.[87,89]

Sea lice are the best known parasites infecting farmed fish and have proven since the 1960s to be particularly problematic for the farmed salmon industry.[90] Parasitic copepods (small crustaceans), sea lice feed on the skin and protective mucus of salmon, and the effects of their feeding can become severe enough to expose bones in the skull and cause death.[15,89] Financial losses due to sea lice infection of salmon can exceed 11% of the total production value due to costs associated with stress, treatment, mortalities, and lowered production.[89]

The treatments that exist for pathogens and parasites may introduce their own welfare problems. In bath treatments, for example, fish are first corralled into a smaller volume and dosed with insecticides, vaccines, antifungals, or other chemicals, before being released with the chemically treated water. Not only may surrounding ecosystems suffer potentially toxic effects,[91] but the treatments have been shown to elicit a stress response in catfish, trout, carp, and tilapia.[9,19,92-94] Bath treatments with hydrogen peroxide, though likely more environmentally friendly, have been shown in trout to increase the stress response, impair oxygen-carrying capacity by the blood, and irritate the gills.[95] Prolonged treatments with certain antiparasitics have been linked to the development of resistance, decreasing the effectiveness of the treatments.[89]

[*] For a thorough review of bacterial diseases in marine systems, see Toranzo AE, Magariños B, and Romalde JL. 2005. A review of the main bacterial fish diseases in mariculture systems. Aquaculture 246:37-61.

Environmental Factors Commonly Associated with the Occurrence of Infectious and Noninfectious Fish Diseases	
Fish Disease Problem	**Predisposing Environmental Factors**
Bacterial gill disease (*Flavobacterium* sp.)	Crowding; chronic low oxygen (4 mg/l for salmonids); elevated ammonia (more than 0.02 mg/l for salmonids); suspended particulate matter
Blue sac, hydrocele	Temperature; ammonia; crowding
Columnaris (*Flexibacter columnaris*)	Crowding or handling during warm-water periods if carrier fish are present
Environmental gill disease	Adverse rearing conditions, but contributory factors currently not well defined
Epithelial tumors, ulceration	Chronic, sublethal contaminant exposure
Fin erosion	Crowding; low level of dissolved oxygen; nutritional imbalances; chronic exposure to trace contaminants; high total suspended solids; secondary bacterial invasion
Furunculosis (*Aeromonas salmonicida*)	Low oxygen (<5 mg/l for salmonids); crowding; temperature; handling when pathogen carriers are present
Hemorrhagic septicemias, red-sore disease (*Aeromonas, Pseudomonas*)	External parasite infestations; ponds not cleaned; crowding; elevated ammonia; low oxygen; stress due to elevated water temperatures; handling after overwintering at low temperatures
Kidney disease (*Renibacterium salmoninarum*)	Water hardness less than about 100 mg/l (as $CaCO_3$); diet composition; crowding; temperature
Nephrolithiasis	Water high in phosphates and carbon dioxide
Parasite infestations	Overcrowded fry and fingerlings; low oxygen; excessive size variation among fish in ponds
Skeletal anomalies	Chronic, sublethal contaminant exposure; adverse environmental quality; PCB, heavy metals, kepone, toxaphene exposures; dietary vitamin C deficiency
Spring viremia of carp	Handling after overwintering at low temperatures
Strawberry disease (rainbow trout)	Uneaten feed; fecal matter with resultant increased saprophytic bacteria; allergic response
Sunburn	Inadequately shaded raceways; dietary vitamin imbalance may be contributory
Swim bladder stress syndrome	Oil films; hypoxia; salinity; other water quality factors
Vibriosis (*Vibrio anguillarum*)	Handling; oxygen <6 mg/l, especially at water temperatures of 10-15°C (50-59°F); salinity 10-15%
White-spot, coagulated-yolk disease	Environmental stress: air supersaturation >102-103%, temperature, metabolic wastes, chronic trace contaminant exposure
This table has been adapted from: Wedemeyer GA. 1997. Effects of rearing conditions on the health and physiological quality of fish in intensive culture. In: Iwama GK, Pickering, AD, Sumpter JP, and Schreck CB (eds.), Fish Stress and Health in Aquaculture, Society for Experiment Biology, Seminar Series 62. (Cambridge, U.K.: Cambridge University Press, pp. 35-71).	

Vaccines have been used successfully against some bacterial diseases, though the welfare of the animals during handling while administering vaccines either through injection or bath treatments must be considered.[62] In-feed treatments are also becoming more commonly used,[89] though may have similar environmental problems to bath treatments.[96] Cleaner fish, animals who eat parasites off the cultured species, have also been employed.[87] Wrasse, the fish used to control sea lice, were initially effective in reducing parasitic loads, but suffered their own welfare problems, including predator attacks and high mortalities from bacterial disease and improper environmental controls.[89]

Discussing diseases, Pickering notes: "In most cases, the immediate cause of mortality in fish farms is disease and it is now well established that stressed fish are more susceptible to a wide range of diseases."[19] Many problems associated with disease and infection can be minimized by decreasing the effects of stress and providing appropriate environmental conditions for farmed fish.[14] Infections pose major welfare problems for farmed fish, and more work is needed on effective treatments that will not diminish welfare.

Selective Breeding, Genetic Selection, and Transgenics

As with other farmed animals,[*] farmed fish undergo selective breeding and genetic manipulation to enhance biologically and economically favored traits, such as rapid growth rate, disease resistance, and reproductive characteristics.[66,97] In some cases, there are positive responses correlated with trait selection; for example, improvements for fry survival and disease resistance in channel catfish have been associated with selection for increased body weight after one generation.[66,98] However, the increases in growth rates for farmed fish are extraordinary in comparison to that of those in the wild, as evidenced by the dramatic differences in the growth of salmon: Genetic selection over ten years and four generations of salmon has increased their weight by more than 60%,[99] while in another study, transgenic salmon were on average 11-times heavier than their non-transgenic counterparts after only one year (one fish was 37-times heavier).[100]

Increasing production characteristics can cause serious welfare problems and should not be used to further intensify production of farmed fish. Summarized Håstein: "[I]f genetic capacity, feed utilisation and feed composition all work maximally towards the same goal, the fish may rapidly be squeezed over the biological limits which leads to a situation that may be characterised as unacceptable from a welfare point of view."[8]

Sex and ploidy, the number of chromosome sets in the nucleus, are manipulated in some fish both to increase growth rates and overall carcass yield, and to delay maturation, which is thought to result in enhanced carcass quality.[66] Sex manipulation is performed to create all-male or all-female populations depending on producer preference and cultured species. All-male populations are created by supplying the male sex hormone testosterone through a feeding regimen to young fish.[34] This is desirable for tilapia since male tilapia grow approximately twice as fast as females.[34] Using sperm from altered males (female-to-male fish) to fertilize normal females will create a population that is all-female,[101] which is desirable for salmonids since females may mature later than males[66,101] and, as previously discussed, carcass quality can degrade after sexual maturity is reached.[65,66] Artificial pressures and temperatures are employed to manipulate the number of chromosome sets in the nucleus, by placing fertilized eggs in a vessel where the pressure and temperature can be raised above normal atmospheric levels to prevent the second meiotic division.[101] This will result in three (triploid) sets of chromosomes, rather than the normal two (diploid) sets, which is advantageous since triploid females are sterile and will not reach maturity.[101,102] Mortality is approximately twice as high in triploid versus diploid salmon in fresh water,[101] and triploid salmon may also be physiologically less equipped to transport oxygen in their blood than diploid salmon, making them more easily affected by conditions of low DO.[101] As such, they should arguably not be subjected for prolonged periods to environments with poor oxygen, such as during crowding, grading, and treatments for sea lice, as this may pose increased risks and mortalities.[101] Some triploid fish are found to suffer higher occurrence of cataracts, increasing the risk of blindness and decreasing the ability to acquire feed, thereby resulting in emaciation,[85] and tetraploid fish, those with four sets of chromosomes, can suffer from spinal deformities.[8]

[*] See www.FarmAnimalWelfare.org for reports on selective breeding and genetic manipulation for production traits.

The insertion of foreign genes to genetically engineer "transgenic" fish is another technique, along with selective breeding and polyploidy, used to enhance industry-desired traits,[66] often at the expense of the fish's welfare. Young, non-transgenic catfish exhibit better predator-avoidance skills compared to transgenic counterparts.[66] Genetically engineered salmon can show decreased swimming capacity, reducing their ability to forage and avoid predators,[66] and some exhibit severe deformities consisting of extra cartilage around the head that disrupts normal ventilation, feeding, and cartilage growth, and increases mortality.[65] Eric Hallerman, Professor and department head of Fisheries and Wildlife Sciences at Virginia Tech, and co-authors note in their review of transgenes on behavior and welfare that for growth rates, selective breeding may forgo the need for transgenesis and ultimately, many welfare issues with transgenic fish remain unanswered.[103]

Nutrition and Feed

Fish have specific dietary requirements relating to micronutrients, fats, proteins, and amino acids.[104,105] The FSBI report that "diets lacking in critical micronutrients impair welfare in many species, according to a range of indicators, such as high mortality, morphological abnormalities, poor immune function, abnormal behaviour, poor feeding, impaired sensory function and slow growth."[9] More than half of the operating budget for intensive aquaculture is feed costs, and proteins, especially from fish meal, are the most expensive component.[106] The production of one pound of some carnivorous species may require up to five pounds of wild fish,[107] and, throughout the overall aquaculture industry, dietary fish inputs exceed outputs by a factor of two to three[108]

A variety of plant sources and animal by-products have been tried as alternative feed sources to fish meal, including soybean meal, cottonseed meal, other oilseed by-products, poultry by-product meal, blood meal, hydrolyzed feather meal, meat and bone meal, and animal manures.[106] For tilapia, these alternatives have been found to generally lower growth and performance compared to use of fish meal, but their inclusion into farmed fish diets has been argued from an economical standpoint.[106] Some non-carnivorous fish species, such as carp and tilapia, may be better suited to proteins from plant-based sources. However, these alternatives may be deficient of essential amino acids, diminishing the health of some carnivorous farmed fish, including salmon.[96] Altering protein sources in feeds can cause digestion problems, irritate the intestines,[109] and cause immune depression.[110] Proper nutrition is vital, particularly before disease outbreaks, as it has been shown to increase resistance to disease and reduce mortalities.[105] Conversely, improper nutrition has been shown to compromise immune function and has also been linked with skeletal deformities.[15,111,112]

Some researchers are critical of the lack of knowledge on nutritional requirements for farmed fish in production systems and recommend further investigation.[105,108] Rune Waagbø, principal scientist at Norway's National Institute of Nutrition and Seafood Research, comments that "evaluation of nutritional impact on fish health is in its infancy….[T]he methods and criteria for optimal nutrient recommendations should be reevaluated to include health factors such as immunology and diseases resistance."[105]

In addition to the complexities of adequate nutrition for farmed fish, significant ecological and environmental impacts on wild fish stocks may be associated with the production and composition of fish feeds. These problems have been thoroughly discussed and strong recommendations have been made for the raising of only herbivorous fish.[91,96,113]

External Impacts

Unless indoors and closed to the natural environment, aquaculture production systems are open to water and/or air. Nursery and grow-out facilities are natural or artificial ponds, tanks, or raceways, or meshed or netted cages or pens typically placed in natural lakes or seas, allowing intimate contact with surrounding waters. As such, these fish farming facilities both affect their surroundings and are affected by them.

Predators pose direct and indirect threats to farmed fish in open aquaculture systems. In addition to direct predation losses, exposure to predators can increase cortisol levels and respiration in the animals.[9] Added physiological stress can be doubly detrimental as it has been linked to impaired anti-predatory behavior and significantly increased mortality.[114] Salmon recovering from handling stress initially have impaired predator-avoidance skills, although they can recover avoidance skills before hormone concentrations return to normal.[115,116] Additionally, feeding behavior is shown to decline when there is risk of predation, possibly a result of redirected visual attention from feed to an approaching predator.[117]

Some predators, such as otters and mink, can attack fish through mesh and netting, injuring and killing more fish than they consume. The resultant injuries and stress may then increase disease suceptibility.[118] The aquaculture industry uses anti-predator devices in attempts to protect stocks from birds, mink, seals, and other predators. Predators not deliberately killed risk ensnarement in nets and drowning.[118,119]

There is some indication that disease can spread both ways between wild fish and those farmed in systems open to the environment.[87] Conte notes that stressed farmed fish with suppressed immune function and sharing waters at higher densities "will often contract disease and/or parasitic infestation."[60] Conversely, sea lice from farmed fish can infect wild species in proximity, increasing mortality of those populations.[120] Since both groups, wild or cultured fish, put each other at risk of disease, closed systems have the advantage of mitigating this harmful relationship, but not without their own significant welfare problems.

The infestation of a natural environment with non-native species, such as when farmed fish escape their enclosures, poses serious concerns. "In the future, farming transgenic, or genetically modified, fish may exacerbate concerns about biological pollution,"[91] concluded Rebecca Goldburg, senior scientist at Environmental Defense, and her co-authors. Damage to netpens allowing fish to escape can occur from natural storms, human error, or marine mammals.[91] Escapees may have lower survival in the wild than native species, though they can continue to compete for resources.[121] Extensive reviews are available on the problems associated with fish escapes and their effects on wildlife and predators, including interbreeding and reduced biodiversity and fitness of wild populations.[91,113,119]

Crowding, Handling, Netting, and Grading

Though typically stressful procedures themselves, crowding, handling, netting, and grading of farmed fish are performed at various stages during aquaculture production[21] often to mitigate other welfare problems. For example, as fish can grow at different rates, grading is often done to separate stock populations into uniform size in order to reduce feeding competition between disparately sized fish.[14] A large body of work has investigated the effects of these procedures on the welfare of farmed fish with hopes to alleviate the stress involved.

Prior to handling, grading, the administration of bath treatments, and transport, fish are often crowded at higher than normal densities. The animals may struggle or attempt escape, suggesting acute stress from overcrowding.[15] In addition to the deleterious effects of high stocking density discussed above, short-term crowding has also been found to increase stress[122] and depress immune function for days after the crowding event.[123,124]

Handling and netting present their own significant health and welfare concerns. The preliminary step of plunging a net into water is believed to evoke fear in some fish[46] and Conte warns, "[i]f not done correctly, excessive stress can jeopardize fish welfare."[11] In water, fish have the force of buoyancy acting against their weight, so the experience of being removed from water is considered both stressful and injurious.[11] If many fish are netted or lifted at once, the weight of the animals pressing down can injure those on the bottom, in some cases causing spine injuries.[11] Handling and netting can also harm the mucus coating and scales of the fish, elevate stress, and increase disease and parasitic susceptibility.[125,126] As netting adversely affects fish welfare, moving the animals by pumping them through transfer pipes where they remain submerged in water is an option that may be the least invasive,[11] though more work must be done in this area to assess its welfare effects.

Oxygen concentration can vary with temperature, so fish should be handled when the water is at its coldest, typically at night. Handling during high temperatures, when there is less oxygen in the water, can cause severe stress and "the associated stress often results in mortality in both the short and long-term."[11] Conte recommends:

"All fish-handling processes should be slow and deliberate so as not to increase the natural avoidance reactions of fish, which can lead to excessive activity and potential exhaustion."[11]

As discussed above, holding differing-sized fish in the same enclosure can cause aggression, fin nipping and other cannibalistic behavior, stress, depressed immune function, reduced growth, and other unwanted results and welfare assaults. To reduce these effects and improve the welfare of smaller fish, they are at times graded by size during the grow-out period.[14] This process requires collecting the fish by netting or pumping them through transfer pipes, and distributing them over a series of parallel bars of differing widths, selecting and collecting fish of similar size.[8] However, as with handling, time for grading should be kept to a minimum as it is known to be stressful, cause damage to the skin and scales, and temporarily decrease feeding rate and growth.[8,11,15]

Transport

Fish are often starved before transport to clear the gut of contents to protect water quality by eliminating the animals' need to void feces[11] and also prior to slaughter to minimize carcass contamination during gutting.[62] Claims that starvation further protects water quality by decreasing oxygen consumption and carbon dioxide production need additional evaluation, as several days of feed-withdrawal may be required to be effective to achieve these aims.[14] Many researchers note that since farmed fish are accustomed to specific feeding regimens, changes in feeding will have negative effects on welfare.[8,79] During periods of food deprivation, fish may nip at eyes and fins, cannibalistic behaviors that can cause eye damage and increased fin erosion,[8,77,127] injuries known to decrease immune capacity.[9,10,15,77] For these reasons, starvation time before transport or slaughter should be evaluated by species and environmental conditions and, if continued to be practiced, should be kept to an absolute minimum.[55,128]

When ready for transport, fish are loaded with lift nets or pumps into transport vehicles, typically trucks or boats, but at times helicopters.[8] As Håstein notes, "conditions during transport such as overcrowding, unacceptable water quality due to low oxygen, may result in irreparable damage to the fish and mortality,"[8] so construction of transport containers must address fish welfare. During transport, continuously circulated and freshly aerated water is the primary physiological need essential to promote fish health,[14,62] particularly as stressed fish can increase their oxygen consumption.[14]

Transport is known to increase concentrations of primary and secondary stress hormones in fish of varying maturity,[21,129-131] in some cases up to 15 times basal levels,[132] and is associated with increased mortalities.[132-134] Injuries sustained during transport are known to elevate susceptibility to fungal infections contributing to post-release mortality.[14] Though it may only take hours to recover from certain physiological effects associated with transport, Wedemeyer recommends "a recovery period of several days before subjecting them to additional stress from other fish culture procedures."[14] Other researchers concur on the effects of handling stress and the need to allow for proper recovery before subjection to additional handling to reduce the risk of compounding stresses and worsening mortalities.[8,55,129,135]

Various techniques to alter the hauling water have been employed to alleviate stress and decrease mortality rates during and following transport.[14] These include chilling the water,[134] or adding anesthetics[136,137] or mineral salts.[133,137] Cool water slows metabolism, reducing oxygen use and wastes, though variations in water temperatures between hauling and destination should be avoided.[14] Anesthetics added to hauling water can reduce swimming activity, thereby preventing some injuries, and suppress metabolic rates, which effectively improve water conditions by reducing oxygen use and the production of ammonia and carbon dioxide.[14] Salts provide protection from a variety of physiological conditions such as blood electrolyte loss, lowered blood pH, and ionoregulatory dysfunction.[14] Though these techniques can improve the animals' ability to cope with challenging conditions, they should not be coupled with increased densities during transport or utilized to compensate for poor water conditions.[14] To ensure the welfare of fish during crowding, handling, netting, grading, and transport, appropriate environmental conditions must be maintained and durations for each stage kept to a minimum, while ample recovery time be provided after these procedures.

Stunning and Slaughter

The production of farmed fish ends at slaughter. From the animal welfare perspective, painless slaughter is a non-negotiable goal—both for those animals who reach market weight and those culled for disease or other reasons. Many researchers agree that the optimum method of killing should avoid excessive physical activity, stress, pain, and suffering prior to slaughter, and should induce immediate insensitivity or unconsciousness throughout the slaughter process until death.[15,55,128,138-140] With all stunning methods, exsanguination by gill-cutting and bleeding should occur after the animals are fully unconsciousness and insensible to pain.

Depending on the time required to induce insensitivity or achieve death, stunning and slaughter methods can be generally classified as slow or fast. David Robb, with the Norwegian aquaculture company EWOS Innovation and the Division of Food Animal Science at the University of Bristol, and co-authors describe slow methods as "generally unacceptable in terms of welfare of the fish"[140] and note faster methods that "cause a rapid loss of sensibility result in the best welfare, providing that they are carried out correctly."[139]

To gauge the effectiveness and immediacy of stunning, visual evoked responses (VERs)—responses to visual stimuli—are used, as they are one of the final measurable responses to external stimuli. Robb *et al.* state "[a]n immediate loss of VERs can be regarded as an immediate stun and therefore humane…."[140] The exhibition by fish of negative behaviors, such as excessive swimming, escape attempts, and other physical activities, is likely an indication that the stunning procedure is aversive and welfare is poor.[139] There are many prolonged and aversive methods of stunning and slaughter. Exsanguination is sometimes performed without stunning, where the gills are cut or ripped by hand and the fish are returned to water to bleed out. This method prolongs the death of fully conscious fish who have been observed as showing aversive reactions, VERs, violent head shaking, and gill movements for up to ten minutes.[140,141]

Suffocating fish in air, another slow-slaughter practice, may be the most common method used in the world.[139] Removing fish from water and asphyxiating them in air is highly aversive and causes escape behaviors and severe stress responses.[139] The time to induce loss of VERs or unconsciousness in this way varies based on temperature and its impact on metabolic rate—taking a few minutes at high temperatures and up to ten minutes at lower temperatures.[138,139,142] Loss of movement takes considerably longer, nearly 200 minutes at near-freezing temperatures (2°C [35.6°F]).[142] Some reports indicate that fish have "sensory capacity" for 15 minutes after removal from water.[8]

Asphyxiation by immersion in ice water, or ice slurry, is a method similar to suffocation in air and can diminish fish welfare and cause significant increases in stress levels.[143] As with suffocation in air, asphyxiation in ice to achieve unconsciousness can last ten minutes for some temperate species such as rainbow trout and five minutes for warm-water species such as sea bream, and may not cause death for three hours.[55,139] Given the prolonged periods needed to induce unconsciousness and the subsequent risk of gill-cutting before loss of consciousness is achieved, the ice slurry method is unacceptable.

Stunning in carbon dioxide-saturated water followed by gill-cutting is another common slaughter method. Many species exhibit extreme aversive reactions to carbon-dioxide narcosis, such as rapid swimming, escape attempts, and vigorous shaking lasting for several minutes.[139-141] Hans van de Vis, a principal at the Institute for Marine Resources and Ecosystem Studies in The Netherlands, and co-authors note that VERs continue beyond six minutes and, as it is possible for conscious states to exist after movement ceases, immobile fish may have their gills severed while conscious.[15,138] Many scientists conclude that stunning by carbon dioxide is inhumane.[15,138]

Since quicker slaughter methods may significantly decrease the time fish are conscious and suffering before death, they offer welfare benefits over slower stunning and slaughter methods. Primary fast-slaughter methods are percussive stunning, spiking, and stunning by electrocution. With percussive stunning, fish are removed from water, immobilized, and clubbed in the head.[139] The differential accelerations between the skull and brain disrupt normal function, causing immediate insensibility.[55,138,140] Spiking is similar to percussive stunning, but instead of using a club to strike the animal, a spike is driven through the brain.[139] When applied correctly and efficiently, percussive stunning and spiking cause immediate loss of movement, VERs, and consciousness without negative reactions.[8,139] Incorrect application of these methods, however, are highly aversive and may be long-lasting and painful.[140]

Stunning by electrocution can also induce unconsciousness in fish. Typically, electricity is passed through a bath containing fish, and, if the current and voltage are sufficient, loss of VERs and movement are immediate.[138,139] Fish show highly aversive reactions after the process if insufficient voltages are used, so improper stunning presents a serious welfare problem.[8,139] The possibility also arises that fish may regain consciousness after stunning, so, as with all slaughter procedures, exsanguination should rapidly follow immediate loss of consciousness.[138] To reduce the immediate effects of long-term crowding when many fish are killed at once, Peter Southgate and Tony Wall, director and founder, respectively, with the U.K.'s Fish Vet Group, recommend that slaughter should proceed as fast as possible, and, immediately before stunning, fish should not be held out of water for more than 15 seconds.[55]

Evaluating welfare at slaughter, Robb and Steve Kestin, of the Division of Farm Animal Science, Behaviour and Welfare Group in the University of Bristol's Department of Clinical and Veterinary Science, find that the slower methods of exsanguination, death in air and in ice, and carbon-dioxide narcosis rank low in terms of measured welfare, while the fast-slaughter methods of percussive stunning, spiking, and electrical stunning rank higher.[139] When discussing ethical considerations for the slaughter of farmed fish, Tony Wall with Scotland's Fish Vet Group notes:[141]

> It is important that we should step back from accepting existing fish slaughter methods and take a long cool look. Perhaps we should be developing a number of pre-harvest strategies which would enable the fish to be killed more easily and would be associated with less stress...In killing large numbers of fish it may not be possible to achieve the mammalian ideal of immediate insensibility. But, if this entails high levels of stress prior to slaughter, it may not be desirable. A low stress system prior to the point of slaughter may be just as important as the actual method used.

Research into acceptable stunning and slaughter methods is still needed to determine best practice for species and conditions. Wall describes some basic objectives the industry should strive for: increasing efficiency without compromising welfare, minimizing the pre-slaughter crowding time, minimizing fear, minimizing the time held out of water, and decreasing pain by insuring a quick stun.[141]

Conclusion

According to the FSBI, "[t]he scientific study of fish welfare lags behind that of the welfare of other vertebrates."[9] At a global animal welfare conference, Håstein identified the "need to critically review all aspects and procedures in modern fish farming in order to establish ethically acceptable farming conditions, feeding and handling regimes, transport, stunning and slaughter methods."[8] Given the billions of fish farmed domestically and globally, the need to understand the implications of aquaculture practices on those animals is critical. Indeed even despite his contention that fish are not sentient—a position highly disputed by the scientific community[26,27,43]—Rose concludes that this "in no way devalues fishes or diminishes our responsibility for respectful and responsible stewardship of them."[25]

According to Håstein *et al.*, "[a]pplying the principles of ethics and animal welfare to poikilothermic aquatic animals involves supplying the things necessary for sustaining life, optimising health and minimising visible discomfort (e.g. pain, stress and fear)."[15] The experience of multiple stressors present at every stage of aquaculture production substantially increases the stress response in fish, which, in turn, affects aspects of physiology, response to predators, and mortality as Pickering warns, "chronic mortalities occur and, to a large extent, reflect the levels of stress to which the fish are subjected."[19] Increasing mortalities are a clear indication that serious welfare problems exist, often from environmental effects, poor water quality, and infections, with some systems maintaining mortality rates of nearly 30% throughout the life cycle.[62,80]

All aspects of aquaculture production should be evaluated to minimize the stress and welfare assaults that fish face. These animals should be afforded the proper environment, water quality, and space to enable them the full range of their natural behaviors, and be protected from stress, disease, predation, negative effects of genetic selection, and inhumane slaughter.

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My Comments on WWF - Salmon Dialogue

AS far as I can see from all the work undertaken by the WWF - to create a standard for farmed and GE fish was to provide the appearance of a safe and sustainable fishery. All the standards are absolutely useless since the assumptions made in the standard of obligation for compliance are not based on any reliable fact.

for instance :
The following rationale "unknown impact on wild populations" of transgenic fish also applies to regular fish farms since fish farms are not required to "prove" their impact on wild salmon.

If the problem we want to minimize - being water pollution - is to find ways to tolerate the pollution - that to me is faulty logic. The farms need to be separated from public water.

It is useless to make the following demand: Presence of documents demonstrating compliance with local and national regulations and requirements on land and water use.

The indicator presumes it to be fact - that local authorities demand compliance - the requirement for compliance in BC water is self regulation. Therefore the standard is useless in matters of stopping pollution and fantastic for the promotion of Farmed Fish. I am outraged at the blatant use of your NGO status to promote global consumption of farmed fish.

As we see in all areas of government regulation of "industry" - there is ample wriggle room for 'business as usual'. Even "if" the farms keep a list of documents - demonstrating that the farm has provided the buyer of its salmon a list of all therapeutics used in production. Buyers don't want to see the list - if they knew that information they would have to reveal it. If the Cohen Commission can't get that fish farm information revealed to the public - how is it possible for buyers to get it? WWF is involved in a scam to legitimize the corporate use of public water for private financial interests.

Counting sea lice is not acceptable since the fish farms have absolutely denied any connection between farmed sea lice as having an impact on wild salmon sustainability. The farms can't have it both ways. If they deny the allegation of problems from sea lice and start counting the numbers of lice on their fish - then the farms and WWF are in fact admitting the connection and therefore ought to take responsibility and get farmed fish out of the ocean. Clearly, the farms cannot prove the impact of sea lice to be negligible any more than Alex Morton can prove her belief that sea lice present a dire impact on wild salmon.

Why defend sea lice anyway? The right of Industry to hold salmon with lice on them as though it is normal or acceptable? Would we allow that of farmed pigs or sheep that shared a common forest? Wild salmon are far more important to the future of this planet than unsustainable farming practice that never has to account for losses to the public's most precious resource - clean water.

There should be no interaction between fish farm practice and the commonly held asset - ocean, river and lake waters. To present your study as legitimate is deceptive when you are clearly working for the interests of industry.

I am very disappointed in WWF (World Wildlife Fund)

Priscilla Judd

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Fisfarmers in and around the Skogseidwaters.
*Organization/Company: Co/ K.J Eide Fiskeoppdrett AS
*E-mail address: ___________ _________

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3			
Principle 4			
Principle 5			
Principle 6			
Principle 7			
General comments			

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
Principle 1			
Principle 2			
Principle 3			
Principle 4			
Principle 5			
Principle 6			
Principle 7	8.25	See attachment	
General comments			

Comment to Aquaculture Stewardship Council standard hearing. We raise concerns over indicator 8.25 where the Standard aim to close down open farms within 5 years. This comment is from the six fishfarm listed in the table below.

Eikelandsosen, Norway, June 14th. 2011.

Aquaculture Stewardship Council (ASC) is meant to be a program for ecological labelling and sertification of fish raised in aquaculture. The aim is to contribute to a sustainable aquaculture industry, but the standard is not yet finished. During this process, it has been proposed that producing salmon smolt in net pens within lakes is not sustainable, and this type of production is suggested to be phased out in five years. This must be based on insufficient or poor information, which we will make up for here.

This kind of smolt production was quite common in the early years of salmon farming in Norway, during the period from the 1970-ies until the 1990-ies. One of the main benefits is that the need of large amounts of water is far less than in the ordinary flow through farms, so this was a good alternative for fish farms situated along the coast line in areas with very restricted drainage basins. Since the water consumption is closely related to the overall fish biomass within the farm, the production of especially large smolts was beneficial within these farms. In addition, the fish acclimatized quickly when transferred to the fish cages in the sea farms, and started to feed immediately.

However, the feeding of fish within small coastal lakes could influence on the eutrophic level of these lakes, and to control and manage this, the University of Bergen (Norway) carried out two large scientific programs during the 1980-ies. The research lead to four dr.thesis and 15 master thesis, and the main conclusion was that both excess fish feed and fish feces increased the nutrient levels to unacceptable levels unless the lake ecosystems were large and capable of convert the nutrients into the food chain without changing the algal amount and composition.

Especially after some unfortunate examples of too large production within too small lakes, the Norwegian environmental protection agency ten years ago stopped all further expansions of such fish farms. Since then, most of the farms has been closed down, and today the farms within the Skogseid drainage basin must be among the very few left that still produce large smolts in freshwater net pens.

This production is today highly regulated to avoid the negative experiences of the past, and to ensure high quality smolts:
All floating farms are sertified according to the technical standard NS 9415, to ensure that the farms can withstand the external loads from water current, wind, waves and ice.
All farms have obligatory monthly inspections of veterinaries (as all other smolt farms).
All farms in Skogseid watercourse has restrictions on the fry they can use in the farms, the so called “fry treaty” regulate that the input of fry must be local
No use of medicines or use of treating chemicals, which can be documentes.
The lake ecosystems are monitored monthly from May to October annually, to document that the nutrient inputs do not influence the fine balanced lake ecosystems. This monitoring is managed by the environmental office of the county governor.

The environmental monitoring consists of a long series of similar measurements, sporadic during the 1980-ies and 1990-ies, but annually since 2001, both in the lake Skogseidvatnet and the lake Henangervatnet. In these two lakes, fish farming, first raising rainbow trout, now producing salmon smolts, has been carried out since the 1960-ies. Today six farms produce exist.

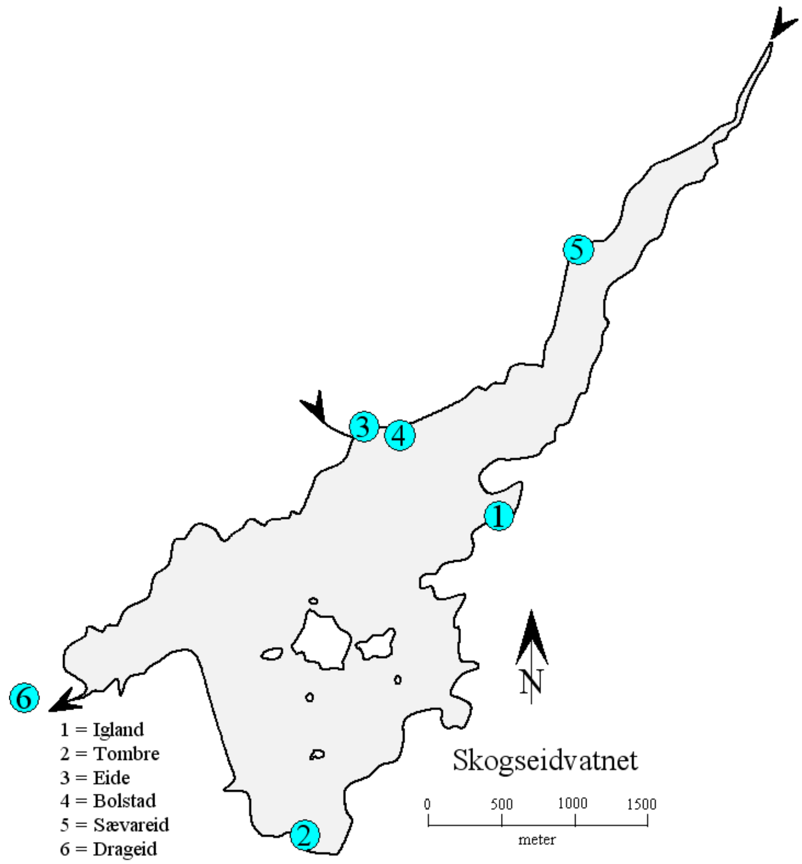

Figure. The six net pen based fish farms in the Skogseid watercourse

Table. The six fish farms.

Fish farm	Reg.no.	Production	Biomasse limit
1) Igland Bruk AS	H/Fs 31	715.000 Net pen salmon smolts	50 tonns / 70 t feed
2) Tombre Fiskeanlegg AS	H/Fs 35	715.000 Net pen salmon smolts	50 tonns / 70 t feed
3) K.J. Eide Fiskeoppdrett AS	H/Fs 28	600.000 net pen salmon smolts	Together :
3) K.J. Eide Fiskeoppdrett AS	H/Fs 38	Land based hatchery and smolts	155 t / 190 t feed
4) Bolstad Bruk AS	H/Fs 02 H/Fs 30	Land based hatchery & net pens	75 tonns / 105 t feed
4) Bolstad Bruk AS	H/Fs 39	Land based hatchery	15 tonns / 21 t feed
5) AS Sævareid Fiskeanlegg	H/Fs 24	Net pen salmon smolts	50 tonns
6) Drageid Laks AS	H/Fs 20	393.000 net pen salmon smolt +	27,5 tonns/38,5 t feed
		Land based hatchery	17 t feed

In spite of an increase in overall production within the six farms during the years of monitoring, no corresponding increase in nutrients are observed within the two lakes of Skogseidvatnet and Henangervatnet (down stream). Both lakes are still considered poor in nutrients, or oligotrophic (figure below), both with respect to concentrations of phosphorous ("fosfor" in Norwegian in figures) and nitrogen. The most recent report summarized the development, and can be found at: http://www.radgivende-biologer.no/uploads/Rapporter/1414.pdf

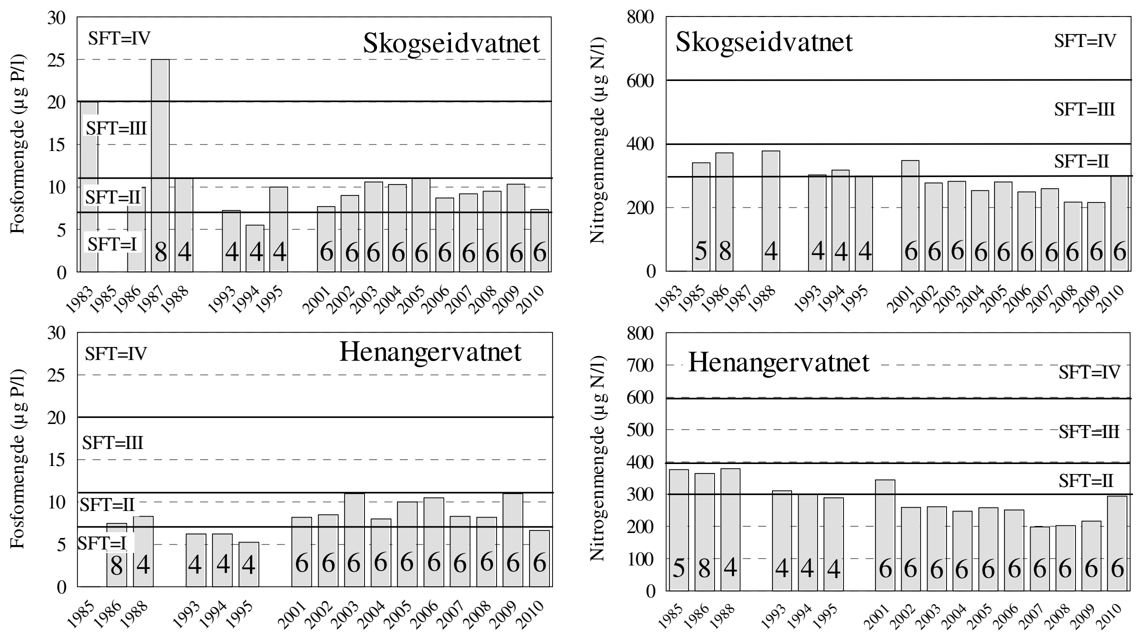

Figure. Development in concentrations of the nutrients from 1985 until today in the two lakes of Skogseidvatnet (upper) og Henangervatnet (lower), phosporous (left figures) and nitrogen (right figures), shown as annual averages , with the number of annual measurements given on each of the columns.

This is mainly due to the large recipient capacity of the two lakes, both from their relatively large volumes and also their flow through, resulting in a good hydrological capacity (table below).

Table. Morphology and hydrology for the two lakes of Skogseidvatnet and Henangervatnet.

Lake	Lake surface area km^2	Lake drainage area km^2	Specific run-off $l/s/km^2$	Annual run-off mill. m^3	Average lake depth	Lake volum mill m^3	Water change x / year
Skogseidvatnet	5,27	97,4	100	307	48	232	1,3
Henangervatnet	2,61	117	100	394	50	130	2,9

Draft SAD Standards – Combined Response from;

Leroy Seafood Group ASA
SalMar ASA
Sjøtroll Havbruk AS
Sinkaberg Hansen AS
Scottish Sea Farms Ltd. (SSF)

Combined total production of farmed salmon = 300,000ts which represents 21 % of global production.

Introduction

As a group of salmon producers, we consider ourselves amongst the global leaders in sustainable production of farmed salmon and therefore should be capable of achieving compliance with the majority of standards in the SAD draft standards.

We have received the second and final draft of the proposed ASC standard, and we are pleased that the draft standard has been amended in some areas, but it still has some major challenges that will be difficult for the industry to meet in the short and longer term.
We are in principle in favor of a standard that can help lift the industry to a new level, however this has to permit industry to remain economically viable. For this to be possible, the standard has to give the industry time to carry out research and develop the technology to find alternatives. We need, therefore, arrangements for derogations , maybe even producer specific and over appropriate time scales. Without this we will not be able to satisfy this standard.
We are also aware that we must comply with all sections 100% in order to be accredited. But with the standard as it is now, this means that virtually no salmon production unit can be approved. This will not benefit the environment in a positive direction. If discrepancies are closed, the company must be able to become certified. We ask that this be taken into account in this latest evaluation round.

Comments from our facilities in Scotland and Norway are attached.

Best regards
Lerøy Seafood Group ASA/ SalMar ASA/ Sjøtroll Havbruk AS/ Sinkaberg Hansen AS/ Scottish Sea Farms Ltd. / SSF)

Anne Hilde Midttveit

Anne Hilde Midttveit
Responsible CSR Lerøy Seafood Group ASA

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Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 1: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14 2011.

*Name: Anne Hilde Midttveit/Eva Haugen/Arve Møgster/ Kari Lenvik
*Organization/Company: Lerøy Seafood Group ASA/SalMar ASA and Sinkaberg Hansen, representing about 300 000 tons of the Norwegian production of Salmon.
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1		ok	
Principle 2	2,2,3	What is the intention with this indicator? We do not think that we have any equipment today who will give us reliable information. There are too many parameters who can influence on these measurements. • Time of day • Time of production cycle • Flow factor • Seasons • Other sources next to the farm • Topographical conditions	The indicator must be removed until we can prove that we have reliable equipment to measure this indicator the right way.
	2,5,3	The standard can not be 0 at this indicator	The farm have to prove at the audit that it has procedures that is good enough to satisfy the intention on this indicator.
Principle 3	3,4,4	We have strong focus on this indicator and we all want this indicator to be as close to 100 % as possible, but today it is not	We need a transitional arrangement at this indicator.

		realistic to believe that we can reach 98%. The equipment we use is not good enough. We need to work together with the equipment vendor to develop equipment which is more reliable then the equipment we use today.	≥ 95% on average. Improving to ≥ 98% within 3 years.
Principle 4	4,7,1	On this indicator it will not be possible for a company to change all the nets in a short period to satisfy the standard.	A net that is previously treated with copper but washed at an on-land net cleaning site without new treatment, must be considered as untreated. To change all our nets we need a transitional arrangement at minimum 5 years.
Principle 5	5,2,2	For the fish welfare we need to be able to use national authorized medication.	Pens with fish treated with medication that are banned in any salmon producing or importing countries. Standard: No
	5,2,5	In generally we believe that this indicator does not belong in this standard. When a medication is national authorized we should be able to use it for the fish welfare if we do not have another alternative. Environmental issues for the medication must be a matter of judgment in connection to the acceptance procedure.	The farm must document that effective preventive measures are used, and be able to document that non-pharmacological treatments such as wrasses, mechanical deliceing or equivalent, including the use of H_2O_2, is chosen as part of their treatment program in order to reduce the use of antiparasitic agents. Standard: Yes
	5,3,2	Bio – assay tests is the best method we have today, but is not reliable. We will use bio-assay because this is the best method we have today, but we can not take any decisions on the results from the bio-assay alone.	Bio – assay tests shall be used as one of the parameters who considers, when fish health authorized personnel decide what to do to avoid resistance. The main issue is to avoid resistance.
Principle 6		ok	
Principle 7		ok	
General comments		Publicly available	Several places in the standard it is prescribed that documents should be Publicly available.

			We will not be able to maintain a web site or to publish our data continuously. We will however be able to give our data to anybody who makes an inquiry. We will register all data which the standard requires and this must be checked during the audit.
		Differs from the standard during audit	There has to be a limited amount of differs from the standard during audit and a fixed period of time to adjust the differs. Without this it will be nearest impossible to achieve this standard and that can not be the intention.

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION (SECTION 8 of document)

Indicator/Standard (e.g., 8.4 or 8.22)	**Comment(s)**	**Proposed solution or amendment**
	ok	
General comments on smolt standards		

187lllComment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

*Name: Paul Uys
*Organization/Company: Loblaw Companies Limited
*E-mail address:
Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

General Comments:
OURS:

- Given our interests in various species, it has come to our attention that the standards required for salmon to do not appear to be consistent with the standards required for other species where we believe there should be consistency. Eg. escapes and feed
- Many standards and indicators seem to be outside the scope of the SAD and the ASC. Loblaw would caution the SAD to ensure that these standards are directed towards original goal to 'credibly develop measurable, performance-based standards that minimize or eliminate the key negative environmental and social impacts of salmon farming, while permitting the industry to remain economically viable'.
- The requirement for a salmon farm to be responsible, and held accountable, for wild populations seems to be unreasonable. It is important however for producers to partner with NGO's, government and the ASC to assist in the management of wild populations.
- There is a concern that the SAD is requesting access to data from producers where it would be more appropriate to collect such data through other avenues such as joint research projects, government, or other associations

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1: Comply with all Applicable National laws and local regulations	All	General Comments:	
	1.1.5 – Presence of documents demonstrating that the farm has provided the buyer of its salmon, a list of all therapeutants used in production.	This section needs to be more clearly defined to ensure that it is not the buyer's responsibility to collect and document this information.	
Principle 2: Conserve		General Comments:	

Natural habitat, local biodiversity and ecosystem function			
	2.1.2	Access to adequate resources (eg. taxonomists) may create a challenge in some jurisdictions	
	2.2.1	Does the prescribed DO level take into account naturally occurring fluctuations in certain regions?	
	2.2.3 – Evidence of weekly monitoring of nitrogen phosphorous levels on farm and at a reference site	It appears that this may be an onerous data collection activity and questions whether the frequency is warranted.	
	2.4.1 – Evidence of an assessment of the farm's potential impacts on biodiversity and nearby ecosystems that contains at minimum: a) identification of proximity to critical, sensitive or protected habitats and species, b) description of the potential impacts the farm might have on biodiversity, with focus on those habitats or species, c) a description of strategies and current and future programs underway to eliminate or minimize any identified impacts the farm might have and to monitor outcomes of these programs and strategies (See Appendix I subsection 3 for details)	The expectation of providing evidence of the individual farm's potential impact on the biodiversity is onerous and therefore, by definition will exclude many producers from being able to meet this standard. Many of these requirements are taken into account by governments and regularly bodies prior to the farm being permitted to operate.	

	2.4.2 – Allowance for the farm to be sited in protected area or areas determined to be of High Conservation Value (HCV)	In our view, the ASC should accept the ruling of the local or federal regulator of the siting of a farm within an HCV.	Suggested amendment: *demonstrate that the farm coordinates with the governing body of the protected area or HCV to ensure that the farm is, within reason, in line with the goals of the protected area of HCV*
Principle 3 – Protect the health and genetic integrity of wild populations			
	3.1.1		Provide criteria that within a specific period of time a farm needs to be a part of an Area Based Management Plan
	3.1.3 Establishment of a maximum sea lice load for the entire ABM and for the individual farm that is based on regulatory requirements. In areas of wild salmonids, loads shall also be based on wild fish monitoring (see Standard 3.1.6) and incorporate a precautionary low maximum lice level just before and during outmigration	We would caution that some of the monitoring requirements to meet this standard may be illegal to undertake in some jurisdictions.	
	3.1.5 In areas with wild salmonids, evidence of data, and the farm's understanding of that data, around salmonid migration routes, migration timing, and stock productivity in major waterways within 50 kilometers of the farm	Access to adequate data may be a challenge in some jurisdictions	

	3.1.6 In areas of wild salmonids, monitoring of sea lice levels on wild out-migrating salmon juveniles or on coastal sea trout (details in Appendix III subsection 1). Monitoring results must be made easily publicly available within 8 weeks of testing	We would caution that some of the monitoring requirements to meet this standard may be illegal to undertake in some jurisdictions.	Government should also have a key role here as the DFO sets quotas based on this type of information.
	3.4.1 Maximum number of escapes episodes (defined as 200 or more fish) with the exception of escape episodes that are clearly documented as being out of the farm's control	Footnote 37 – not clear whether 100 year storms are an exceptional episode or not, this footnote is not clear	
Principle 4 – Use resources in an environmentally efficient and responsible manner			
	4.2.2 Fish oil Forage Fish Dependency Ratio (FFDRo) for grow-out (calculated using formulas in Appendix IV, subsection 1), OR Maximum percentage EPA and DHA from direct marine sources (calculated according to Appendix IV, subsection 2)	Will this level meet Canadian omega 3 level targets for making nutritional claims which is crucial to support the sale of salmon?	
	4.3.1 Timeframe for all fishmeal and fish oil used in feed to come from fisheries certified under a scheme that is ISEAL accredited and has guidelines that specifically promote		Consider amending to say ISEAL or equivalent

	responsible environmental management of small pelagic fisheries.		
	4.3.2 Prior to achieving 4.3.1, the FishSource score for the fishery (ies) from which all marine raw material in feed is derived. (See Appendix IV, subsection 4 for explanation of FishSource scoring)	MSC certified source for feed should automatically qualify it for the SAD feed standard.	
	4.4.3 Evidence of disclosure to the buyer of the salmon of inclusion of transgenic plant raw material, or raw materials derived from transgenic plants, in the feed		Amend to disclosure upon buyer request
Principle 5 – Manage disease and parasites in an environmentally responsible manner			
Principle 6 – Develop and operate farms in a socially responsible manner		Loblaw acknowledges the fair and equitable rights of workers worldwide and prescribes all of our suppliers to sign a code of conduct that stipulates that workers are treated according to the labour laws governing their jurisdiction. However, we believe that the inclusion of this principle has added a significant complexity to what is already an extremely intricate and exacting standard.	
Principle 7 – Be a good neighbor and			

conscientious citizen			
General comments			

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3			
Principle 4			
Principle 5			
Principle 6			
Principle 7			
General comments			

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Aruna Jayawardane
*Organization/Company: Maliseet Nation Conservation Council
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2	2.4.1	It is necessary to develop a standard in relation to the minimum distance where a farm could set up from the sensitive species habitats	
Principle 3	3.4.1	0.15>, in the most recent production cycle	
Principle 4			
Principle 5	5.1.7	The maximum mortality rate of farmed fish during the previous two production cycles should be less than or equal 20%	
Principle 6			
Principle 7	7.2.3	It is also necessary to follow any protocols developed by indigenous groups to be followed by outsiders prior to initiate	

		development/research projects impacting the traditional territories/culturally sensitive areas etc.	
General comments			

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3	8.5 & 8.6	Make the standards more clear. It's not clear in the current form	
Principle 4			
Principle 5			
Principle 6			
Principle 7			
General comments			

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period: 14^{th} May – 14^{th} June
Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14th, 2011

*Name: Dawn Purchase
*Organization/Company: Marine Conservation Society, UK.
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's
e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
1	1.1.6	Additional text. Rationale is to ensure compliance with industry codes of practice to ensure a baseline of operating procedure and cooperation within the industry.	Presence of documents demonstrating compliance with all local codes of practice for production.
2	2.4.1		Farms should only operate or develop in areas that have been fully mapped, as part of a wider planning process, to identify both areas of sensitive habitat and sensitive species. The farms should then demonstrate that their operations have no adverse impact on either habitat or species. Please see Delivering Planning Reform document and reference to SNH nature sensitivity maps within it. http://www.scotland.gov.uk/Resource/Doc/304025/0095384.pdf

	2.5.1 & 2.5.4	As the standard currently stands it allows for the use of lethal predator control but bans or phases out the use of one of the key non-lethal predator control measures available to producers. It would be preferable as this standard that is aimed at the top 20% of producers, to encourage non-lethal predator control entirely. It seems a little perverse to not allow the correct legal use of a non-lethal control measure for fear of causing disturbance yet allow for lethal predator control!	2.5.1 Number of days where ADD's or AHD's are used in areas that cannot prove that their use does not adversely effect non-target marine mammals. None. 2.5.2 ADD's and AHD's in use should be deployed on a ad-hoc basis to specifically deter a persistent predator IF by doing so no other marine mammals are adversely affected.
Principle 3	3.1.5		3.1.5 In areas with wild salmonids, evidence of data ***and plans based on that data to minimise potential conflicts, etc.......***
	3.4.1. & 3.4.2 & 3.4.3.	There is a loophole here and I suggest that these are combined a reworded. What about a loss of up to 199 fish, which can happen on a regular basis and are due to know cause of escape? These kind of escapes are permitted as the standard current stands. A count of 200 fish (per episode) or 300 (per production cycle) is meaningless when you have an accuracy requirement of >= 98%. In a net pen containing 50,000 fish 2% is equal to 1000 fish.	Suggest a stronger focus on daily net inspection, correct installation of equipment, employee training as part of an induction package before working on site, robust netting and regular net changes.
Principle 4	4.3.1	We would suggest that fishmeal and fish oil come from BOTH MSC certified fisheries via IFFO RS certified producers as the IFFO RS scheme covers production standards in the factory and	Suggest there should be incremental goals towards this 5-year target. For example 3 years after SAD standard publication feed should have 10% ISEAL certified fisheries inclusion.

		will be developed to cover pollution criteria.	
	4.3.2. & 4.3.3	Whatever score you set for fisheries in relation to Fishsource you will still encounter problems of the practical application of it. How will a fishmeal and fish oil manufacturer segregate wild capture feed fisheries at the production plant based on their Fishsource score? Who will audit it? How do these two relate? Does a fishery have to have a sustainability score via Fishsource but be traceable via IFFO RS? IFFO RS will not be able to confirm traceability of a Fishsource scored fisheries unless it is also IFFO certified.	Suggest that the IFFO RS scheme is incorporated into 4.3.2 To read that prior to achieving 4.3.1. raw marine ingredients should be sourced from IFFO RS compliant feed manufactures and only contain IFFO RS compliant feed ingredients that have a Fishsource score as outlined. Fulfilling the above requirement would also ensure compliance with 4.3.3.
	4.3.4	How will this be audited? How will by-products from these species be identified, segregated and excluded from the diet. IFFO RS includes a by-product module so would suggest that you revert to the IFFO standard to address this issue. MCS supports the maximum use of by-products and trimmings. The use of IFFO RS certified trimmings should be encouraged and supported as these will preclude IUCN Critically Endangered and Endangered species and will assess the Vulnerable IUCN listed species before inclusion.	Requiring compliance with the IFFO RS By-products module would achieve 4.3.4 and should be included here.
			Include the paragraph on page 34 of the FTAD standards relating to the use of land

			animal by-products.
	4.7.1	There is no need to use copper based antifoulants on nets, environmental best practice would be to use net cleaning, net weathering via a swim through system, net exchange using double netting or non-toxic antifoulants. As this standard is aimed at the top 20% of producers demonstrating best practice the use of copper is not appropriate in these standards.	% of nets that are treated with copper based antifoulants = 0
Principle 5	5.1.3		% of dead fish removed and disposed of **on a daily basis**
	5.3	The SAD needs to act as a driver away from the chemical arms race that is sea lice treatments. As this is written it allows the use of another sea lice treatment chemical when resistance is built up to another. It should be encouraging the development and use of non-chemical sea lice treatments such as strategic siting, bioemitters, cleaner wrasse and pheromone use.	5.4.3 The use of a non-chemical sea lice treatment regime to support and prevent resistance development to conventional sea lice treatments. Within 1 year of SAD publication.
General comments		It is essential that cross cutting issues from each of the dialogues are normalized and checked for consistency. It will only serve to weaken the whole ASC process if the same issues are dealt with in different ways across the whole of the dialogue standard development process.	

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3	8.5 & 8.6 & 8.7	There is a loophole here and I suggest that these are combined a reworded. What about a loss of up to 199 fish, which can happen on a regular basis and are due to know cause of escape? These kind of escapes are permitted as the standard current stands. A count of 200 fish (per episode) or 300 (per production cycle) is meaningless when you have an accuracy requirement of >= 98%. In a net pen containing 50,000 fish 2% is equal to 1000 fish.	Suggest a stronger focus on daily net inspection, correct installation of equipment, employee training as part of an induction package before working on site, robust netting and regular net changes.

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Sharon DeDominicis
*Organization/Company: Marine Harvest Canada
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2	2.1.2	Marine Harvest Canada agrees that traditional biological endpoints, including abundance, species richness, biomass and Shannon's diversity index are generally considered to be the best indicators of biological health. *However, in BC we would want this to be a second tier survey if the sediment chemistry (sulfide/redox/TVS) indicated that something was wrong.* This is due to the following considerations: 1. There is a serious lack of taxonomists in British Columbia. This affects the time to process samples. It can take up to 6 months to complete taxonomy for a single farm. This is not practicable for certification process, as the farm will be stocked before results are known. It's critical to understand that this professional gap is not currently being addressed in BC. 2. The provincial and federal governments spent millions of dollars and nearly a decade linking chemical surrogates to taxonomic information. This was a conscience decision taken by our scientists and regulators to develop a rapid and	A tiered approach would be preferable. Requirement to complete taxonomic samples only if chemical threshold exceeded.

		scientifically robust methodology to manage the benthos. 3. Shannon's Diversity Index has been linked to farm impacts and chemical surrogates (sulfide, redox, TVS). According to Brooks (2001 – Focused Study) - benthic taxa are extremely sensitive to disturbance, about one half of the taxa disappear at 55µM sulfide. (Consider that reference station sulfide levels are often 100 uM or higher.) From this we can see that sulfide is a very sensitive indicator of disturbance. 4. Farms have a pulse effect on the sea floor. The substrate recovers chemically, then biologically. Biological recovery follows the natural spawning cycles of the organisms. Farm cycles are not synchronized with natural benthic taxa spawning; therefore a site could be ready for recruitment by taxa, but not recruited until the organisms nearby reproduce, each according to their individual life history strategies. What is the biological endpoint we are trying to achieve with the monitoring and the management of the taxa? We know that taxa beneath farms are opportunistic – and that farms recover quickly. Is the concern spatial, temporal or something else?	
	2.2.1	DO levels in parts of BC which, at specific period of the year, will be low due to natural up-welling from deeper water. This happens irrespective of salmon farming. DO wouldn't be used to measure phytoplankton effects and should be dropped.	Remove indicator. It doesn't add any value.
	2.2.3	Natural background levels of N & P have to be accounted for and before an eventual standard is set farms should do test monitoring during a production cycle to check if a standard can be meaningful	Set standard if test monitoring demonstrates that it is meaningful
	2.5.6	Harbour seal and California sea lion populations are steadily increasing in BC. Populations are now at pre-colonization levels. Example: http://www.dfo-mpo.gc.ca/CSAS/Csas/Publications/SAR-AS/2009/2009_011_e.pdf Farming companies are striving to improve technology to reduce conflicts. However, DFO surveys indicate that this is likely not a conservation issue.	The standard should allow for killing of 5 marine mammals over the prior two years.

Principle 3	3.1.2	Demonstrated commitment by company, not necessarily at farm level.	Not required for each individual farm, but required at the company level.
	3.1.4	Weekly testing for lice during outmigration period only.	Scope to outmigration period only.
	3.1.6	In BC DFO threshold is 7.5 leps for pink salmon <0.7gram. As this is based on the only actual controlled lab trials completed, we suggest this threshold is maintained until new documentation is available.	Adopt DFO threshold for pink salmon for other salmon species (as precautionary) until thresholds for other species are determined.
	3.1.7	SLICE is currently the only therapeutant treatment permitted in British Columbia to control lice. Preventing the development of resistance is a major concern. Slice should be applied with caution and only when absolutely required. The current threshold of 3 motile lice (as per DFO mandate) appears to be functioning to protect wild fish and maintain the efficacy of SLICE. http://www.pac.dfo-mpo.gc.ca/science/aquaculture/pinksalmon-saumonrose/results-resultats/index-eng.htm	Option B is the best alternative
	3.4.3	Concern for cumulative error on counting device (i.e. 2% error each time).	The standard needs to allow stock inventory reconciliation that considers cumulative error.
Principle 4	4.4.3	Sufficient product that meets this standard not available.	Reassess standard after 5 years.
Principle 5	5.1.2	All fish health managers to be under the direct supervision of veterinarian; therefore reduce required veterinarian visits to 2 times/year.	Reduce required veterinarian visits to twice/year/site.
	5.2.8/8.17	We believe the main intention of the WHO in their attempt to reduce antibiotics listed as critically important for human health in veterinary medicine has been to reduce the occurrence of zoonosis (a known problem for instance with chicken in Asia). As far as we know there are no infectious diseases that can be transferred from salmon to humans. In order to maintain good fish health, salmon	Remove standard. Include risk assessment for critically important antibiotics in standard 5.2.7/8.16 (along with highly important antibiotics)

		farmers should therefore, as a last resort for treating bacterial diseases, be allowed to use antibiotics that are on the WHO list. The salmon aquaculture industry is a relatively small industry dependant on few available drugs. If rotation of drugs is not possible and suboptimal choices regarding sensitivity need to be taken due to such a ban, this may compromise a responsible drug management policy to avoid drug resistance developing. We also regard it to be wrong in this case to prevent whole drug classes.	
	5.3.2	In regions with only one type of treatment allowed for use (only Slice allowed in BC) this standard is not possible to meet	Remove standard as impossible to meet in BC.
	7.1.3	Environmental and human health risks have not been established with respect to therapeutants and salmon farms. Complete risk assessment prior to jumping to the conclusion that antibiotic warning signs are required.	Replace with general signage stating public safety exclusion zone.

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Petter Arnesen
*Organization/Company: Marine Harvest Group
*E-mail address: ______________________________

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
		As a general comment we believe that the ASC standard should allow for continuous improvement and recognize the logistics and cost implications for a company wanting to serve its customers with ASC certified salmon. We believe it is unrealistic that a sufficient number of farms (needed to gain traction in the market for ASC certified fish) will be able to become certified if all standards have to be met 100%. Unless a farm can meet all criteria at the outset there is no flexibility or encouragement for prospective operators to achieve the standard. Had there been less of a prescriptive approach, by relaxing certain criteria, greater interest may have been shown to strive to meet the Standards. Better to have started with a lower baseline working towards targets set on continuous improvement. We also believe that any standard giving a transition period should start the transition period from when the standards have been finalised and issued by the ASC (ready for certification). In other words not from the time the SAD steering committee submits the standards to the ASC	
Principle 1			

Principle 2	2.1.1 – 2.1.3	Some of the suggested indicators require methodology that is not commonly used today and likely to have a high cost There may also regional differences and natural variation that should be taken into account. This applies for instance to DO levels in parts of BC which, at specific period of the year, will be low due to natural up-welling from deeper water. This happens irrespective of salmon farming DO wouldn't be used to measure phytoplankton effects and should be dropped	The standard should require monitoring of benthic diversity and benthic effects for a period of two production cycles in order to establish baseline values for the suggested indicators. Following the monitoring period, concrete standards should be set with reference to registered baseline values. Regional differences should be accepted and a tiered approach would be preferable. Requirement to complete taxonomic samples only if chemical threshold exceeded. 2.2.1 should be removed as it doesn't add value
	2.2.3	Natural background levels of N & P have to be accounted for and before an eventual standard is set farms should do test monitoring during a production cycle to check if a standard can be meaningful	Set standard if test monitoring demonstrates that it is meaningful
	2.4.2	Sites established in accordance with national regulations that satisfy requirements set by international agreements on areas of High Conservation Value should be allowed to stay in the area	
	2.5.1/2.5.2/2.5.3/2.5.6	As written the standard accepts that lethal action against marine mammals (read seals) may be used as a last resort as long as the animal in question is not endangered/red-listed. At the same time the standard requires that ADDs are abolished within two years of the date of publication of the SAD standard. The main argument for the abolishment of ADDs is that the high pitched sounds from these devices may cause pain to dolphins, porpoises and whales and possibly interfere with the communication between some of these animals. As a result marine mammals may be scared away from natural feeding and breeding grounds. If ADDs are to be abolished it is logical to allow for killing a higher number of seals than suggested in the standard draft. ADDs are a requirement on many sites as part of planning	The standard should allow for killing of 5 marine mammals over the prior two years (2.5.6)

		permission and to achieve the target of zero shooting. It is disappointing that all ADDs are categorised as being harmful to cetaceans when this may not always be the case. For example, work at the Sea Mammal Research Unit (St Andrew's University) is focussing on a new startle response seal scaring system. We believe the use of ADDs should be reviewed. Harbour seal and California sea lion populations are growing 7-15% annually in BC. Populations are at pre-colonization levels. Not a conservation concern.	
Principle 3	3.1.2	Demonstrated commitment by company, not necessarily at farm level (for each farm). There is a missed opportunity here for Scotland. As it stands it is likely the majority of the Scottish industry will be excluded from the Standards because of freshwater loch smolt rearing. The collaborative research work that could be undertaken in Scotland is therefore unlikely as outlined in this Criterion.	Not required for each individual farm, but required at the company level.
	3.1.5	We understand the intention of the standards under criterion 3.1 to be to reduce sea lice infection pressure on wild salmon as they migrate out to sea	Footnote 29 should refer only to wild salmonid migration route (remove habitat)
	3.1.6	In BC DFO threshold is 7.5 leps/gram for pink salmon. As this is based on the only actual lab trial completed, we suggest this threshold is maintained until new documentation is available	
	3.1.7	Maintaining 0.1 mature female lice per farmed fish at all times will in many cases mean unnecessary use of treatments. Should be avoided both for environmental impact reasons and possible build-up of resistance. In jurisdictions with access to only a limited number of therapeutants (e.g. BC with only one), resistance risk is of major concern. A 3 motile threshold as per DFO mandate should therefore	Option B is the best alternative

		be maintained in BC	
	3.4.3	On average it is not possible to reach this level of accuracy today, but new counting equipment will hopefully make it possible in the future	The standard should allow for a three-year transition period to move from 95 > 98%
Principle 4	4.7.4	Local variation in background levels of Cu should be accounted for	The standard should distinguish between local background levels and direct farm discharge of Cu
Principle 5	5.1.7	A mortalities reduction program should only be required for farms that exceed a specific mortality	Standard should require a mortalities reduction program only for sites that have mortality rates higher than 10% over the previous three production cycles
	5.2.8/8.17	We believe the main intention of the WHO in their attempt to reduce antibiotics listed as critically important for human health in veterinary medicine has been to reduce the transmission of resistant or multi resistant zoonotic agents from food animals to humans. Zoonotic agents like Salmonella, Campylobacter, Yersinia and Shigella are such risks that are not uncommon issues from pig and poultry production and in particular in Asia. It is a well known fact that there are very few infectious diseases that can be transferred from salmon to humans, and in comparison with livestock food production this risk is negligible. Nevertheless we do support measures to avoid any use of antibacterial agents in a non-responsible way, i.e. prophylactically use of antibacterial agents or use of antibacterial agents as growth promoters. Such use would increase the risk of resistance development significantly and is not sustainable. An approach as proposed in the latest version of the SAD standard which effectively bans all agents that belongs to any drug class listed by WHO as critically important for human medicine are on the other hand too radical and this is as far as we understand not within the scope of the WHO initiative neither in animal medicine or in aqua medicine. The salmon aquaculture industry is a relatively small industry dependant on few available drugs. If rotation of drugs is not possible and suboptimal choices regarding sensitivity need to be taken due to such a ban, this may compromise	Remove standard. Include risk assessment for critically important antibiotics in standard 5.2.7/8.16 (along with highly important antibiotics)

		a responsible drug management policy to avoid drug resistance developing. We also regard it to be wrong in this case to prevent whole drug classes. In order to maintain good fish health, salmon farmers should therefore, as a last resort for treating bacterial diseases, be allowed to use antibiotics that are on the WHO list as long as it is documented that these drugs are used to a limited extent to maintain a drug rotation programme and where this risk evaluation is verified by a certified veterinarian.	
	5.3.2	In regions with only one type of treatment allowed for use (only Slice allowed in BC) this standard is not possible to meet	
	5.4.3	Fitting wellboats with new equipment is a costly an time consuming process. The standard should therefore allow for a reasonable transition period	The standard should give a transition period of three years after the ASC standard has been published for having the described equipment in place
	7.1.3	Environmental and human health risks have not been established with respect to therapeutants and salmon farms. Complete risk assessment prior to jumping to the conclusion that antibiotic warning signs are required.	Replace with general signage stating public safety exclusion zone.
	8.24	Rather than be prescriptive in this Criterion we would have preferred to see a time limit set of 15 years to cease operations in the freshwater lochs in Scotland. The reasons for this are: 1. It is unrealistic to expect the Scottish industry to move from freshwater lochs to land based hatcheries at short notice 2. As a rough guide to replace 10 million smolts grown in freshwater lochs would mean an investment in the region of £20 million for land based hatcheries 3. Time is required to locate and acquire suitable land capable of being developed for land based hatcheries 4. A reasonable notice period is needed to inform employees, communities and politicians that freshwater loch facilities are	As long as production can be undertaken within the assimilative capacity of the water body the standard should allow for a transition period 15 years in Scotland. An appropriate transition period should also be given in BC One or more escapes events shall result in withdrawal of certification

		closing. Given that many of these facilities are in remote Highland locations the social consequences of closure are significant From the time this method of smolt rearing began in the late 1970s we believe the Scottish salmon industry has demonstrated an excellent record of operating in freshwater lochs. It is important to point out that from the very start we were required to obtain planning permission from the local planning authority, consent from the Scottish Environment Protection Agency for medicine use and biomass allowance and from the riparian owners who own the lochs. Escapes from freshwater lochs (and sea farms) are at their lowest levels since official Scottish Government records began in 2002. Please see the attached chart showing escapes over this period. The figures have been provided by Marine Scotland, The Scottish Government. To date 1,540 fish have escaped in Scotland during 2011. We wish to emphasise that the Scottish salmon and trout industries are working collaboratively on a Freshwater Containment Code of Practice. This new Code of Practice will form part of the Scottish Technical Standard which will define standards for equipment and installation. The STS is a joint initiative involving Scottish Government, salmon and trout industries initiative collaborating with equipment suppliers, insurers and academia. It is anticipated that a draft STS will be available for consultation in October 2011. We hope that this important development will be taken into account by the SAD Committee seeing it as an important step in continuous improvement for minimising escapes in the Scottish salmon and trout industries. On this subject we are curious to know why trout rearing in freshwater will be allowed in net pen systems but salmon smolt rearing will not. Further information can be found at http://www.scotland.gov.uk/Topics/marine/Fish-Shellfish/18692 Fish health in our freshwater lochs is at a high level. In 2007 we were granted an increase of 50% in production biomass for the Marine Harvest smolt farm in Loch Arkaig. Had there been any health issues this increase would not have been granted. Water quality is monitored by The University of Stirling to ensure no	

		alteration to the oligotrophic status in our freshwater lochs and accordingly we fall well within the standard set by SEPA. The method of smolt rearing in Scottish freshwater lochs is permitted under Scots Law and as such is well regulated by agencies of The Scottish Government who have a responsibility for both wild fisheries and aquaculture and the environment common to both industries. In Scotland we believe we are making good progress with containment, have an excellent health record in a natural freshwater environment that is well monitored and hope that through demonstrating continuous improvement, the SAD Committee will reflect on these key areas and consider adopting a less prescriptive approach towards freshwater loch rearing. Finally, we would hope at the very least, the SAD Committee would await the outcome of The Scottish Government's Study into the Impacts of Open Pen Freshwater Aquaculture Production on Wild Fisheries soon to be commissioned. The aims of the study are: • Firstly to provide an assessment, giving specific consideration to the impacts of open pen freshwater aquaculture production on wild fisheries in Scotland. • Secondly to assess the implications to the industry in Scotland of moving to closed containment freshwater production http://www.scotland.gov.uk/Topics/Research/About/EBAR/research-opportunities/CR201019	

Comment form for Draft Salmon Aquaculture Dialogue Standards

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Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: HM / RL
*Organization/Company: Marks and Spencer
*E-mail address:

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COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1		OK	
Principle 2	2.5.1 and 2.5.2	Our supplier, SSF, has considerable experience in the use of ADDs and believes that some of the reasons quoted for not allowing the use of ADDs are incorrect; A recent Scottish study of the effects and utility of ADDs (SARF 44, not yet published) shows that the aversive effect on the behaviour of cetaceans and porpoises may not be as great as previous Canadian studies suggest. SSF's 10 year experience of using ADDs clearly shows that ADDs do not become ineffective over time. SSF has site specific management of ADDs which are operated according to the level of challenge from seals. ADDs may be installed but not operated, but ready for	ADDs should be permitted as part of a hierarchy of seal deterrent activity, in order to reduce the likelihood that a seal would ever have to be shot, or that a fish might escape through damaged nets. Their use should be limited to periods when there is clear evidence of seal activity. At certain sites in particularly sensitive areas for cetaceans, SNH may require an application to the Scottish Government to permit ADD use. ADD systems are being developed with improved triggering mechanisms, and a device operating at sound frequencies closer to the seals hearing range (and therefore less audible to other species) is being tested. There could be a commitment to minimising

		operation should seal activity become evident. The above management technique therefore significantly reduces the potential interaction of ADDs with cetaceans and porpoises. The suggestion that predator nets could be used does not address any of the issues (such as by-catch) surrounding their use at certain locations. It does not address welfare issues concerning animals and birds which may become entangled in the predator nets and this therefore contradicts criterion 1.1. The standards ask that lethal action is used as a final resort; by completely preventing the use of ADD's farmers will have fewer mechanisms available to them to deter SEALS and may be forced to resort to lethal action more frequently.	the use of ADDs and active participation in research leading to alternative means of control. ADD's should be allowable in areas where they will have no effect or impact on cetaceans. These areas are currently being determined by Scottish National Heritage through cetacean area mapping.
	2.5.3	Animal welfare is a fundamental part of the M&S approach to the farming of livestock. We have taken guidance from the RSPCA on this matter, who have assessed the welfare implications for the livestock, as well as the predator seals. M&S have a very strict policy on the use of lethal action and their supplier employs several measures to deter seals from persistently attacking farmed fish. These include ADD, tensioned nets and removal of moribund fish. Keeping firearms on site is strictly forbidden to prevent inappropriate use. We have worked with seal welfare groups to find alternatives and every incidence of seal	The exception used in the trout standard should be applied to the salmon standard: *'…where the farm can provide evidence of a third party assessment that demonstrates that lethal action against a particular predator is appropriate, necessary and represents no risks to wild populations or ecosystems. This exception cannot be applied to species that are threatened, endangered or critically endangered. The assessment must come from an EIA or any other credible process of environmental analysis performed by a capable third party accredited by the national authority or regulator.'*

		attacks is recorded. Lethal action is taken as an absolute last resort, in line with RSPCA advice. Our supplier operates a comprehensive programme to deter predators and with specific reference to seals will only resort to culling once all other possibilities have been exhausted. Not having the option to cull out a rogue seal for example would be an unacceptable situation with regard to fish welfare and prevention of fish escapes. Our supplier has a 'statutory duty of care' for salmon welfare. Under the **Animal Health and Welfare (Scotland) Act 2006,** there is a requirement for salmon farmers to protect their stock.	We propose, in line with our supplier, that as per new legislation to be introduced to Scotland, licences to cull seals should be issued to fish farms which take into account local seal population dynamics and which are issued on the basis that all possible measures of deterrent are in place beforehand. Where appropriate, farms should work with SNH to monitor local seal populations. (as before)
Principle 3		Please refer to our producer, SSF's response	(as per SSF response)
Principle 4	4.2	M&S have developed a farming process which delivers a unique product, high in long chain omega 3 fatty acids and it is these health promoting properties which appeal to our customers the most. The proposed maximum levels for fishmeal and oil as they currently stand, are forcing retailers to choose between achieving the ASC standard, and producing a healthy product, which maintain fatty acid levels at a similar level to those of wild salmon. The ASC is, in effect, dictating a product specification, rather than a standard that will drive good farming practice. By discounting sources of fishmeal and oil which are certified as sustainable, the incentive for having achieved the highest	Fishmeal and fish oil from sources which have been certified sustainable by a third party (i.e. MSC) should be omitted from the FFDR calculation. Concerns over the current process for assessing the sustainability of forage fisheries are now being addressed, and changes to the assessment methodologies will be adopted through a peer reviewed and validated process.

		standards of fishery management such as MSC certification could be increased dramatically. M&S fully support the standards' aim of reducing the use of forage fish in salmon feeds, and will only use oil and meal from fisheries which have been certified by a third party as sustainable. No allowance is made in the calculations of the potential situation that salmon processing waste (e.g. viscera) maybe processed into animal feed (non-ruminant terrestrials).The volume of fish oil and fishmeal produced, should be deducted from the FFDR input values.	
	4.2.1	With standard diets using 20% fishmeal a FFDRm of <1.31 is achievable. However with diets using higher marine content raw materials (45% fishmeal) this will not be possible.	
	4.2.2	A FFDRo of <2.85 will be impossible with typical diets using 30% added oil and no plant oil substitution. To achieve <2.85, fish oil would have to be substituted by at least 65% and this would undermine the Omega 3 content and the health benefits of the product. Currently there are not adequate supplies of trimmings oil to supply the industry.	It will be impossible for our supplier to comply and we recommend that a 5 year period is provided to allow for adequate volume of MSC (or equivalent) certified fisheries to become available, as well as the development of oil supplies from trimmings. Any slight change to the fish oil level within the M&S diet would require a significant trial period and research prior to any changes being made. We strongly believe that retailers and our suppliers should be given the opportunity to demonstrate a reduction in marine oil dependency in a formal and reviewed plan. A

			transition period of 5 years is essential in order for this to be achieved. We are an innovative retailer and committed to developing further trim oil supplies (utlisation of our self generated waste) and algal EPA/DHA production. This must form part of the 5 year compliance period.
	4.2.3	A FPI of 80% prior to 2014 should be achievable with most diets.	
	4.3.1	5 years not an unreasonable period to achieve this, and Peruvian Anchovy Fishery currently going through IFFO certification.	
	4.3.2	We challenge whether the 'Fishsource' score is a valid system since it is based on a group of fishery scientists who are part of a non-accredited organisation who make assessments purely by reviewing published data which maybe out of date, and there is no physical auditing of fisheries. Absence of data can disproportionately down score a species, e.g. Peruvian Anchovy has an evaluation category of E mainly because there is a n/a in answer to the question 'will the stock be healthy in the future?'	Suggest Fishsource system has potential to be improved and cannot be effective if assessments are made on unavailable data. Prior to achieving 4.3.1., should have option of 4.3.2 **OR** 4.3.3. No change
	4.3.3	We agree with this, but there could be issues with the time to complete the necessary auditing and certification process, e.g. situation in Peru with IFFO certification.	More time should be given to allow IFFO certification. Prior to achieving 4.3.1., should have option of 4.3.2 **OR** 4.3.3. No change
	4.6	No change in this area so we have kept our	

		previous submission. There is an important contradiction between this section and 3.1.1 in the smolt production standards, since this section aims to reduce the energy use and emissions involved in the production of salmon, but standard 3.1.1 (smolt production stds) will significantly increase the amount of energy required. Re-circulation systems are intensive and energy hungry. Freshwater cage systems are low energy and low intensity systems with particular benefits for the welfare of the fish.	
Principle 5	5.2.5	See SSF submission	
Principle 6	OK		
Principle 7	OK		
General comments			

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
Principle 1			
Principle 2	2.2 and 2.3	Please refer to our supplier, SSF's position	

Principle 3	3.1.1	Unacceptable for Scottish Industry to prohibit use of cages in freshwater lochs where there are native salmonids, since all locations of smolt cages would potentially come under this category, and this would affect more than 50% of smolt production. In the rationale the impacts for concern include the effect of escapes on wild populations, nutrient loading, disease transmission, and antibiotics and chemicals entering the environment. In Scotland (as opposed to Chile) there is no strong evidence that any of these concerns are significant. All of these potential impacts are controlled and monitored by SEPA and Scotland Marine Science. The Industry has reviewed the code of practice for containment in Freshwater, which includes increased technical specification of moorings, cage structure and nets. There are a number of studies to show that escapes do not impact on wild fisheries both in Scotland & Norway.	Floating cages should be permitted in freshwater lochs where native salmonids are present, and SSF will support the existing Scottish regulatory and industry controls to eliminate the impacts of concern. 50% of Scottish Smolt production is currently land based however this is fragmented between a number of farm companies. No one company can comply or could currently produce enough volume to comply to a full conversion to land based smolt production. Associated costs of investment are unrealistic. Please also see SSF comments for reference.
		This contradicts the Criterion 4.6 on energy consumption, since to relocate all freshwater cage production to re-circulation systems would significantly increase energy use as well as conflict with current welfare standards in relation to stocking densities.	
Principle 4			
Principle 5			

Principle 6			
Principle 7			
General comments			

WWF Salmon Aquaculture Dialogue Steering Committee:

I am writing to oppose the concept of certifying fish farm net pens in wild fish habitat and to specifically oppose the World Wildlife Fund's effort to certify salmon farms in British Columbia.

Fish farming breaks the natural laws by confining fish in unnatural conditions isolated from the predators that work to control disease. Caged fish are vaccinated and treated with drugs in attempt control sea lice and kill bacteria. There are viruses that remain uncontrollable, but farm fish only live a short time before being killed and so the farmer often wins in the race against time with viruses.

Wild fish do not receive protection through drugs and face an extremely rigorous life. Wild fish and pathogens have evolved together in a dynamic balance that is destroyed by ocean feedlots. Fish farmers introduce huge anomalous populations of fish into wild fish habitat, breeding pathogens in absence of predators, and then drug their fish to keep them alive. Most of these drug treatments are oral and there is always a percentage of fish in a farm that are not feeding. Thus pathogens amplify to unnatural levels and waft out of the pens via currents. Today, every wild salmon migration route on the south coast of BC is being used to flush these pathogen loads into direct contact with the gills of wild salmon. This is a biological attack that wild fish have not evolved a mechanism to survive. There is nothing the in WWF recommendations that even acknowledge this.

For this reason, attempts by "environmental" organizations to certify any species of farm fish in net pens is an active step towards destruction of life in our oceans. Feedlots have to be under quarantine, we learned this with bird flu. The dynamic is identical with fish feedlots.

Furthermore, the salmon farming industry has imported tens of millions of Atlantic salmon into the Pacific. They have already caused a massive epidemic with an influenza-type virus (ISAv) in the south Pacific and they threaten the North Pacific with the same virus. I find it negligent that the World Wildlife Fund and the environmental groups of British Columbia that are involved could possibly have gotten this far with no mention that currently, there is no government mechanism to prevent Infectious Salmon Anemia from entering British Columbia in eggs. The Canadian federal **Fish Health Certificate** used to certify foreign hatcheries for export of Atlantic salmon eggs into Canada has a short list of diseases that does not include Infectious Salmon Anemia, a virus spreading around the world wherever Norwegian salmon farms appear. You have failed to address the single greatest threat from salmon farms to the North Pacific.

There are some things that can be negotiated, resolved by tweaking, but netpen marine feedlots in the ocean is not one of them. There is no biological solution to breaking the natural laws that control disease there is no way to do the wrong thing.

I reject this certification process as an industrial greenwash with catastrophic consequence.

Alexandra Morton

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Odd Grydeland
*Organization/Company: Namsos Invest Ltd.
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1	1.1.1-1.1.4	This will be a nightmare of paperwork- huge amount of regulations that could be applied to aquaculture in Canada	In Canada, the documentation required should be limited to the demonstration of compliance with the Conditions of the Aquaculture License
Principle 2	2.1.1 & 2.1.3	Do "sessile macrophytes and/or worms" live in sediments with Sulphide levels above 1,500 microMoles?	If not, this criteria (2.1.3) doesn't make sense
	2.2.1 2.5.6	As stated in the Rationale, DO levels "naturally fluctuate in the environment"- this indicator is generally beyond the control of the salmon farmer. Does this apply to fish? Shellfish? Crustaceans?	This should be a recommendation rather than a standard. Should specify which animals this applies to
Principle 3	3.1.4	Weekly sampling too frequent	Use British Columbia protocol
	3.1.6 Rationale	Sampling of wild fish should be done by government, academia. End of paragraph 3, page 24 should read' …"because of the *potential for* transmission	Industry can participate and provide in-kind support

	Criterion 3.4- Rationale	of disease…..” Regional, science-based lice levels on farms must be pursued. Much of this doesn’t apply to farming Atlantic salmon in British Columbia- this should be recognized and applied to standards	
Principle 4			
Principle 5	5.1.7	This should only apply for farms with a mortality level above a certain threshold (>6%/yr?)	
Principle 6			
Principle 7			
General comments		Annual certification is excessive	Farms that have been certified for a long period (3-5 years?) should not need annual renewals/audits

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3			
Principle 4			

Principle 5			
Principle 6			
Principle 7			
General comments	Page 68- Additional information	The reference to spawning success from precocious male parr doesn't apply to British Columbia. And no smolt producer is interested in producing a large amount of these fish	Explain regional differences, encourage production methods that reduce number of precocious parr, if ever a problem

Comments on the WWF Salmon Aquaculture Dialogue Draft Standard
June 8, 2011

Darrell Green
Research and Development Coordinator
Newfoundland Aquaculture Industry Association

Preamble
Thank you for permitting us to comment on the draft WWF Salmon Aquaculture Dialogue Standards and for bringing such an important dialogue to this stage of development.

General Comments:

- The NL salmon farming industry is seen as a global leader in terms of performance, environmental and socioeconomic sustainability; however, our industry would face significant challenges in being able to meet the proposed standard as outlined at present. We suspect few operations in the world, if any, would be able to.
- Standards, such as these, do recognize the improvements in environmental and social responsibility the industry has made and will continue to make on an ongoing basis, however the arguments for some of the prescriptive standards are not that well supported by science or do reflect the scientific advances made in these areas, and we are disappointed that Steering Committee has not taken more of the relevant science available into consideration.
- How does WWF reconcile the fact the Salmon Dialogue Standards do not meet the FAO Aquaculture Guidelines for Certification, recently adopted by 160+ countries?
- The WWF standards recognize environmental impacts and social considerations; however there is no indication of the socioeconomic wellbeing provided, only minimal labour laws / standards. Why avoid the socioeconomic aspects, so critical to any sustainable activity, including ocean farming?
- As an observation, the standards, as they are now written, would not allow farms operating closed-containment systems nearshore or on land, to be in compliance or be certified to much of the standard. Is this a concern for WWF?
- There are several sections in the proposed standard that are clearly not relevant to environmental or social considerations. For example the need to demonstrate that taxes are paid by a company is irrelevant to WWF and none of their business. Such a standard should be taken out as it has nothing to do with compliance in regulations, environmental sustainability or social responsibility.
- In several parts of the standard, the ASC would retain fish health information or company specific information on fish health or other attributes. We would argue that ANY standard holder only requires <u>verification</u> of performance to the standard and NOT compilation of company specific database information on select topics, such as sea lice counts, water quality or tissue testing, etc. It is not the role of, nor is it appropriate for, a standard holder to compile company specific data. The auditor would receive this data when validating the standards. We have indicated which sections this pertains to.

Clause or sub-clause	Comment
1.1.2	All companies would be in compliance with this clause, however this clause is clearly not relevant to environmental or social considerations. Should be removed.
1.1.5	Providing a list of therapeutants is not needed since all therapeutants are approved by Health Canada with appropriate science based safeguards in place: withdrawal times and residue limits are audited by Canadian Food Inspection Agency and sent to processors. Suggest changing the clause to read: ….. lists of all therapeutants used are available to the processor and buyer upon request.
2.1.1	1500 µmol sulfide as a broad based coverage is not supported by science as some areas are naturally above this level without aquaculture. There is not enough info given on this index. In some areas, hard bottoms may result in depositional environments and it is not possible to measure sulfide levels with accuracy.
2.1.4	Models for the demonstration of the AZE are few and don't always apply to all areas, so this may not always be possible. For example, currently DEPOMOD is considered to be the best modeling system for deposition. If this model is shown not to work well in an area, there may not be a suitable, science-based validated model available. Also the standard mentions distances (e.g. 30 M) but doesn't say from where. This requires clarification in the guidance to auditors, however, we are unsure as to why the AZE which is thought to range from 25-125m from netpens has been limited to 30m distance. What is the scientific rationale for this?
2.2.3	There is no good scientific reason given in the standard why this monitoring should be done. Phosphorous is not a limiting element in the marine environment, for example…besides closed-containment operations will not pass the test….is this envisaged by the standard? We would argue that it is not appropriate for a standard holder to compile company specific database information. Clause should be removed.
2.3.1	Feed bags being tested in this way after delivery at the farm is problematic on remote sites as there may be no method to return to the feed manufacturer, or to dispose of in a responsible manner any feed which fails the test.
2.4.1	We appreciate the aim of this clause in avoiding sensitive habitat, however site assessments are requirement of the site application process in Canada and so this clause is not needed. The assessments are consistent will all international agreements on biodiversity, species at risk, CITES, etc. As well, during the assessment it is impossible to 'prove' that there will be no impact. If changes in the ecosystem occur it is often impossible to pinpoint the cause, as ecosystems themselves, by their very nature, are dynamic and changing. In fact with climate change impacts a real concern in coastal areas, separating habitat impacts from environmental shifts and anthropogenic impacts is not easily done.
2.4.2	Criteria for ecologically significant locales often allow properly managed industry activities – e.g. some Marine Protected Areas (MPAs) allow fisheries, tourism, or other economic activities to operate. By virtue of the fact that these areas are defined (if not defined by a government, group, etc. then not covered by this standard), they are well

	managed with conservation in mind. More concern should be for areas which have not been studies and defined – e.g. in developing countries.
2.5	Reference # 25 is an incomplete reference and does not appear to be peer reviewed, in any event. It is an opinion piece, and has no place in this document.
2.5.4	Senior management and regulatory approval for lethal action may not be appropriate (timing) in cases where there is risk of escapes or risk to human health and safety. There is no allowance made for this. Guidance is needed – is this besides mammals and birds or including mammals and birds?
2.5.6	Guidance is needed on this clause. Is this again referring to only mammals and birds? What is defined as an 'incident'? i.e. does 9 predator mortalities from one event = 9 incidents or 1 incident?
3.1.1	Some areas are now working towards ABM schemes but may not have them in place. (e.g. in NL such an approach is under development by a multidisciplinary committee and all companies already apply the principles of ABM – biosecurity practices, fallowing / rotation, separation of year classes, infrastructure restrictions, etc). These programs require tremendous scientific info to be collected, and with growing industries new sites take time to be incorporated into ABMs. Need provisions for regions developing an ABM approach. Could amend to read "within 5 years of date of publication…."
3.1.5	Scientific data on salmonid migration routes and timing does not exist for all jurisdictions.
3.1.3 and 3.1.6	Monitoring wild fish is not something aquaculture operators have equipment to do or are experienced at doing. Monitoring is outside the responsibility of salmon farming companies (chicken producers have not been asked to sample wild ducks for bird flu). And the monitoring itself would likely have more of a negative impact on the wild fish than the potential natural sea lice infections on wild fish might have. Also, sea lice would be found on wild fish even if aquaculture had never existed. Impossible to tell if numbers are increased because of the presence of aquaculture. Several published papers on this in BC are correlative, but not strongly so, and this has yet to be confirmed with genetics. To capture wild fish in Canada, and most or all other countries, one would have to get government approval which is not granted typically to fish farming operations due to regulatory restrictions
3.1.4	This would not be needed at times when lice numbers are known to be low (e.g. when temperatures don't allow growth and reproduction of the lice) This could be reworded to exempt these periods from sampling (e.g. sampling only above certain temperature). Should also specify only in areas or outmigration of wild salmon. The phrase "made publically available within 7 days of testing" is not realistic… We also question the reason for having this since the veterinary (regulatory) authority has this info anyway and posts it, and this aggregate data is infinitely more useful than individual farm data. Also these data could be easily misinterpreted by "public" and other groups.....do beef chicken and pork producers post health status weekly or at all?
3.1.6	Delete. Wild fish monitoring is outside the responsibility of individual farms and illegal in some jurisdictions makes this indicator unachievable. It could also contribute to a larger number of fish being killed through monitoring than as a result of potential natural sea lice infections. Posting within 8 weeks would not be possible if you want to ensure the integrity of the data.

3.1.7	Since lice levels are environmentally variable and difficult to predict, even with proper sampling programs, it is difficult to meet goals 100% of the time. This is exacerbated in remote sites or in areas where there is otherwise a delay in accessing therapeutants (e.g. Newfoundland – therapeutant has to be shipped from other provinces) Also, we would like to see some scientific justification for the use and setting of these thresholds.
3.1.8	Again, we would argue that it is not appropriate for a standard holder to compile company specific database information.
3.2.2	There is some clarification needed with respect to the word species since a 'strain' maybe sometimes be considered a separate species depending on the criteria used.
3.3	We appreciate the inclusion of this clause and agree with the intention.
3.4.1	We would like to see more guidance on how one would "document" that events are "out of the farm's control." There is guidance saying what is NOT covered here but nothing to give the auditor guidance on examples of things which are, or documentation of these.
3.4.5	We agree that this is an important clause – we are world leaders in this.
4.1.1	There needs to be more guidance re: "level of detail needed to meet the standard" Some common feed ingredients may be sourced from several producers and mixed together before delivery to feed manufacturers. In some cases there may not be appropriate standards for the third party to audit ingredient traceability against. We would suggest to amend to read that this be a requirement "within 5 years of date of publication of this standard"
4.2.2	Marine oils and EPA / DHA from alternative sources (e.g. algae, fish silage, etc) are becoming important in reducing reliance on traditional fish oils and should be excluded from the calculation.
4.3.1	There are many fisheries which are sustainable and are not certified through MSC (several fisheries are reconsidering their MSC accreditation). Are there ISEAL accredited *fisheries* certification schemes other than MSC?
5.1.4	Post mortem analysis may not be available in any practical way in all areas. Based on the volume of analysis needed, may not be feasible to ship mortalities to distant labs. Also, guidance needed; does this include all mortalities, including the natural mortalities that would be within expected numbers for populations without the presence of disease? Also, not all mortalities are in a condition which is suitable for post mortem analysis; fish carcasses deteriorate rapidly in some case much less than 24 hrs making it impossible to provide a valid sample for PMA.
5.1.5 – 5.1.6	Some farm activities (e.g. shipping of smolt over land) have inherent high risk for mortality. This risk, while minimized, does exist and sometimes mortality events happen. Mortalities from these activities should be exempt from mortality counts.
5.3.1	There may not be alternative permitted (and efficacious) treatments available in all jurisdictions. Also, is emergency drug release considered "permitted?"
5.4.4	The phrase "evidence of strong disease management practices, including culling" could be misinterpreted to mean evidence of practices (e.g. disinfection, etc) and also culling under all circumstances when disease is found. Should be amended to "evidence of strong disease management practices, <u>which may include</u> culling." Cull orders are jurisdiction of provincial fish health management programs, excepting where there is an OIE reportable disease and required eradication order. Also "exotic diseases and / or parasites" could be misinterpreted to be exotic diseases and / or ***ALL*** parasites including endemic. Should change to "exotic diseases and / or

	exotic parasites" if this is the intent. Also, refer to OIE guidance on what is considered notifiable, reportable, etc.
6.7.2	In some remote areas or where the industry is at a smaller scale (e.g. NL) there may not be a choice of suppliers, so having such a policy would be a moot point and enforcing the policy would be impossible.
8.8	In some remote areas or where the industry is at a smaller scale (e.g. NL) recycling programs may not yet exist, so having such a policy would be a moot point and enforcing the policy would be impossible.
8.18	The phrase "evidence of strong disease management practices, including culling" could be misinterpreted to mean evidence of practices (e.g. disinfection, etc) and also culling under all circumstances when disease is found. Should be amended to "which may include culling." Cull orders are jurisdiction of provincial fish health management programs. Also "exotic diseases and / or parasites" could be misinterpreted to be exotic diseases and / or ***ALL*** parasites including endemic. Should change to "exotic diseases and / or exotic parasites" if this is the intent.
8.24	Additional guidance needed: Does this include on the final growout site in the marine environment? If not then should specify.
8.25	Additional guidance needed: Does this include on the final growout site in the marine environment? If not then should specify.

Comments by the New England Aquarium on the Second Draft Salmon Aquaculture Dialogue Standards

Principle 4

For Comment Period Ending June 14th, 2011

Matthew Thompson, Jason Clermont, Michelle Cho

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Principle 4: Use of resources in an environmentally efficient and responsible manner:
We feel that currently these standards may not effectively define and control what is required for a number of reasons:

1. Scoring systems and "bars" used to measure compliance are outside the control of the dialogue process and the ASC. These "outside systems" could change in their environmental rigor, be used for raw materials that are inconsistent with the goals of the dialogue and thus could remotely affect the overall rigor the ASC certification. This could also create supply issues for certified producers.
2. Confidence/Peer review in the data/scoring process might be insufficient to verify compliance and are outside the control of the dialogue process and the ASC.
3. Reliance of effort outside the control of the dialogue process and the ASC. To meet some of these goals at least one third party would need to undertake additional effort even if the "bar" is met, this could create supply issues for feed mills.
4. Potential for conflict of interest. Using systems outside the control of the standard to prove compliance could create conflicts of interest within those systems, especially where there is direct involvement with the raw material evaluated.
5. Added cost and logistical requirement.

There are a number of possible solutions to these issues, including; 1. Requiring the use of a specific revision of the system used for evaluation as part of the standard, 2 (and to a degree) 4. Including the requirement a degree of peer-review of an evaluation as part of the standard.

We feel that the most effective resolution would be for the dialogue (and thus the ASC) to set specific requirements for marine ingredients as the standard. Several of the systems used as standards now could be used by feed companies to demonstrate compliance with the standard.

Alternative Recommendation for Criterion 4.3

Future Requirements (<5 years from publication of the standard):
All feed used must have independent, third-party verification (e.g., certification or other audited report) that all marine ingredients are fully traceable, and that they show species sourced, country of origin, gear type used, and bycatch species associated with the fishery and that these meet the marine ingredient requirements stated below.

Interim Requirement:
Feed must come from feed mills that have signed a declaration that all marine ingredients meet the following requirements and disclose species sourced, country of origin, gear type used, and bycatch species associated with the fishery. Information on marine ingredients must be available to farmers and auditors on request.

The following marine products, including byproducts and trimmings, are excluded from feeds:

- All krill and krill products (Reviewed at next standard review)
- Unregulated fisheries bycatch
- All organisms originating from fisheries for which the following terms are applied by government organizations, fishery managers or organizations such as FAO and ICES:
    - Overexploited
    - Harvested unsustainably or at risk of being harvested unsustainably
    - Fishery closed (except as part of area closures as part of adaptive management)
    - Recommendation of no fishing
    - Stock status critical
    - Bycatch of IUCN endangered or critically endangered species
    - IUU fishing probable
    - Damages critical habitats (e.g., dynamite, poison fishing)

- All organisms originating from fisheries without formal management plans except where fishery health is effectively maintained through restrictions and output controls (e.g., no take of 'berried' females and precautionary size limits)
- All organisms originating from fisheries listed as endangered or critically endangered by the IUCN
- Any products of the same genus to the species for which the feed is intended.

Preferential Sourcing of Aquatic Resources:
Preferentially or increasing current sourcing of farmed fish byproducts and trimmings from ASC certified farms and from marine fisheries from sources that are independently certified to meet the above requirements should be included.

Additional advantages of this approach:

- Offers flexibility of ways to meet the specified requirements, which includes common certifications but also allows companies to independently have fisheries assessed or work with elements of a fishery to meet the requirement. This potentially could increase the volume of acceptable sources, reducing competition and cost for resources currently accepted in the draft standard.
- Potential to reduce costs and lag time required for fisheries to be evaluated

Other recommendations:

- ASC develop a feed standard, ensuring auditing of raw material usage
- Develop an interim multi-stakeholder marine ingredient peer-review panel for raw material assessments

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Michael Tlusty, Katy Hladki, and Matt Thompson
*Organization/Company: New England Aquarium
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

Preamble:
These comments are provided to the Salmon Aquaculture Dialogue (SAD) on the Second Draft Standards for Responsible Salmon Aquaculture by the New England Aquarium. Founded in 1969, the New England Aquarium is a global leader in ocean exploration and marine conservation and is committed to building awareness and finding innovative solutions through our marine conservation and research initiatives. The Aquarium's Sustainable Seafood Advisory Services (SSAS) aims to foster long-term sustainability of seafood resources and their supporting ecosystems by raising public awareness and working with the seafood industry to promote continuous improvements and best practices within wild-capture fisheries and aquaculture operations. We appreciate the opportunity to review and comment on these draft standards. These comments should not be considered an endorsement of the SAD or its standards; neither should the suggestions made be considered conditions to obtain that endorsement. We recognize the challenges and potential benefits of certification schemes and offer comments and suggestions to strengthen these standards. These comments are presented from a general perspective and are not prescriptive, as the SAD Steering Committee will generate the specific technical values.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1	1.1.5	It seems overly prescriptive to require this. This issue should be dealt with by importing countries and does not have significant environmental consequence.	Remove standard
Principle 2	2.1.1	The values for redox and sulfides are not equivalent.	If farms are only required to measure one parameter, values should be set as equivalents.
		Sulfide of 1,500 microMole/l is too high to protect benthic environmental degradation.	Re-evaluate this number, for reference see New Brunswick salmon regulations where action is required at 1300 microMole/l sulfide levels
	2.1.1-2.1.2	These standards are set too high if measured outside the AZE.	All of the measurements in these standards should be taken directly under the cage at peak biomass. The standards should require that farms be at reference outside of the AZE.
	2.1.3	More clarification is needed as to where macrofauna testing is done within the AZE.	Clearly define where macrofauna measurements should be taken within the AZE. For example,

			macrofauna measurements should be taken directly under the cage at peak biomass.
	2.1.4	Change the means by which the AZE is determined	AZE should be set at 30m and within 3 years a farm should perform a robust depositional footprint to ensure that there is no impact outside the AZE
	Footnote 4	More clarification is needed as to where measurements should be taken for sulfide levels, redox potential, and faunal index score.	Standard should require that measurements taken to determine sulfide levels, redox potential, and faunal index score be taken outside the AZE (30 meters) in the direction of the current.
	2.2.2	1.85 mg/liter DO is too low.	Reevaluate this number.
	2.2.3	This standard needs to allow for bad weather events that prevent testing.	Change to monthly testing of nitrogen and phosphorus levels on farm and at reference site
	2.2.3	More clarification is needed as to where measurements for N and P should be taken for both farm sites and reference sites.	Standard should explicitly state where N and P measurements should be taken on the farm and for reference sites. For example, “monthly monitoring of N and P levels of water directly in salmon cages and 30 meters outside the farm in the direction of the current”.
	Footnote 18	The definition of protected area is too vague.	Clearly state how protected areas will be determined and remove the words “or other effective means” from footnote 18.
	2.5.1-2.5.2	AHD or ADDs should not be allowed for standard set to capture top producers.	Remove standard 2.5.1 and 2.5.2.
	2.5.3	Mortalities of any red listed animal should be prohibited.	Standard should read “number of mortalities of endangered or IUCN red-listed species”
	2.5.4	This is overly prescriptive and does not allow for quick actions that could be necessary to protect worker safety.	Remove
	2.5.7	This standard is too vague	Require documented evidence of problem assessment and mitigation after the death of a predator.
Principle 3	3.1.3	This indicator needs more definition as it is currently vague, difficult to enforce, and would not lead to a consistent standard across regions.	Define who is responsible for determining maximum lice levels in an area, as well as the term “precautionary low”. if each individual ABM is allowed to determine “appropriate” area lice levels, there will be no consistency in this standard and it will ultimately have little environmental relevance.
	Footnote 35	This footnote is too vague.	Clearly define the term “unrelated organism”.
	3.4.1 and 3.4.2	These two standards are inconsistent.	The number of fish allowed to escape in one event should equal the total number allowed to escape as the environmental impact would be the same. This standard should use the precautionary number of 200 used in 3.4.1.
	3.4.4	This standard is not strong enough.	A limit on the percent of unexplained losses should be set a 5%.

	3.4.5	This would be covered under principle 1.	Delete
	Footnote 37	The 10-year exception period should be more clearly defined.	The 10 year exception period should start at the beginning of the production cycle for which the farm first applied for certification.
	Footnote 37	Issues of vandalism are out of the control of the farm.	Vandalism should not be counted in this standard as it is completely out of the control of the farm and an unintended consequence of increased security which could be reduce public access. This standard also provides an incentive to vandalize.
	4.3.1-4.3.4		Please see attached feed document.
	4.4.3	Individual countries and businesses already have their own regulations and reporting requirements for transgenic products. Furthermore, this standard does not have any direct environmental benefits.	Remove from document.
	4.6.3	This standard seems overly difficult for a single farm to achieve.	Remove, or would be better suited in a specific feed standard.
	4.7.2	Footnote 63 is addressing copper-treated nets but in the standard is addressing all nets.	Clarify if this standard applies to all nets or just copper-treated nets.
	4.7.5	This standard needs further explanation.	What is considered approved? What about chemicals that are not banned or chemicals that have residue limits? What about Canadian regulations?
Principle 5	5.1.2	Vet visits should be more about presence of disease than specific time frames.	Beyond setting a limit of vet site visits, also include provisions requiring increased visitation and monitoring during disease or parasite outbreaks.
	5.1.5	This standard is not strong enough.	≤Average mortality over the last three production cycles should be ≤ 13.3%
	Footnote 67	This note is too vague.	Define “mortality event”. Also set a minimum percent of fish that need post-mortem analysis after a mortality event.
	5.1.6	The allowable number is set too high.	This standard should be lowered. Furthermore, it seems to conflict with 5.1.4.
	5.2.1	This standard is not strict enough.	Targets should be set for allowable amounts of chemical use or at least reduction of chemical use over X years.
	5.2.2	If chemicals are banned they should be covered by standards dealing with laws and regulations. Also what about chemicals that are allowed but have residue limits?	Remove this standard and replace it with a standard that specifically addresses residue limit issues.
	5.2.4	This standard is pointless without subsequent residue testing.	Verify standard with residue sampling.
		Redundant based on standard 5.2.3.	Remove.
	5.2.6	A risk assessment as defined in footnote 78 is	Remove.

		outside the scope of a vet.	
	5.2.8	These chemicals may be needed in hatchery production which can be contained through closed production.	No use in open production. Residue levels must be verified with sampling.
	5.3.1	Missing something here?	Bio-assay resistance testing should be done before fish are treated.
	5.4.2	This standard is not strong enough.	No movement of live fish from one sea site to another or holding in open systems at processing plants.
	5.4.4	This standard needs to be more clearly defined. Furthermore, there are no baseline biosecurity measures within this criterion against which "additional" biosecurity can be measured.	Define "additional biosecurity" measures. Define "strong disease management." This criterion should also include biosecurity minimums or baselines, i.e., footbaths, separate dive equipment, etc. Lastly, if it is determined by a fish health professional that the exotic disease or parasite is not 100% treatable, culling should be mandatory.
Principle 6			Should include a zero fatality within X years standard.
	6.4.2	Incidents of discrimination can happen, even under good working conditions; the most important issue is how they are addressed.	Number of unaddressed incidents of discrimination.
	6.5.1	This standard should include access to a first aid responder.	A first aid responder, or employee trained in medical response should be on premises at all times when work is being done.
	6.5.3	This standard should be more specific.	Safety risk assessment must include proximity to medical facility and proximity to a hyperbaric chamber for divers.
	6.9.2	This standard is overly prescriptive and should be at the discretion of the company.	Remove.
Principle 7			
	Footnote 111	This footnote is too vague.	Define "proximity of indigenous territories".
General comments	Appendix II	Definition of ABM	An ABM should reflect a logical geographic scope such as a fjord or a collection of fjords that are ecologically connected and within three years from the publication of this standard be defined by hydrographics to demonstrate a minimum of two tidal excursions.
	Appendix IV: Footnote 137		Concerns that this incentivizes intentional degradation of human food fish.

On page 67 of the SAD document, it states "the vast majority of salmon smolt production takes place in closed or semi-closed systems where these impacts can be significantly reduced in a way that is not possible in fully open systems, such as net pens." If a vast majority of smolts are already produced using the preferred method, then the smolt standard should simply prohibit open net-pen smolt production, especially because this standard is aimed at a minority of top producers and not the vast majority. The smolt standard should focus greatly on biosecurity, disease testing and alternatives to treatments, such as vaccinations. Sourcing of disease-free broodstock and preventing escapes should receive greater attention in the smolt standard. The smolt standard requires greater attention than as an addition to the grow-out standard because the performance of stocked fish is greatly affected by the quality of these fish and could be a source of vertical transmission and introduction of novel diseases.

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3			
Principle 4			
Principle 5			
Principle 6			
Principle 7			
General comments			

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Margreet van Vilsteren
*Organization/Company:North Sea Foundation (Stichting De Noordzee)
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2	Indicator 2.4.1		Farms should only operate or develop in areas that have been fully mapped, as part of a wider planning process, to identify both areas of sensitive habitat and sensitive species. The farms should then demonstrate that their operations have no adverse impact on either habitat or species. Please see Delivering Planning Reform document and reference to SNH nature sensitivity maps within it. http://www.scotland.gov.uk/Resource/Doc/304025/0095384.pdf
	Indicator 2.5.1 & 2.5.4	As the standard currently stands it allows for the use of lethal predator control but bans or phases out the use of one of the key non-lethal predator control measures available to producers. It would be preferable as this standard that is aimed at the top 20% of producers, to encourage non-lethal predator control entirely. It seems a little perverse to not allow	2.5.1 Number of days where ADD's or AHD's are used in areas that cannot prove that their use does not adversely effect non-target marine mammals. None. 2.5.2 ADD's and AHD's in use should be deployed on a ad-hoc basis to specifically deter a persistent predator IF by doing so no other marine mammals are adversely affected.

		the correct legal use of a non-lethal control measure for fear of causing disturbance yet allow for lethal predator control!	
	Indicator 2.5.4	What is the rationale behind: Approval was given from a senior manager above the farm manager?	
Principle 3	Indicator 3.1.5		3.1.5 In areas with wild salmonids, evidence of data ***and plans based on that data to minimise potential conflicts, etc…….***
	Criterion 3.4	What is the use of a maximum number of escapes of 300 fish if this is lower than the accuracy of the counting technology?	To have best practices be promoted.(e.g. double netting, robust netting etc) and included in the standard. Only setting a maximum number of escapes which are lower than the accuracy of the counting technology is not enough.
Principle 4	Indicator 4.3.1	NSF suggests to make a step in between. It is hard to achieve 100% suddenly in 5 years. The 10% in three years will give the industry the opportunity to prepare themselves and if the 10% is not achieved in three years, it will be a signal that a lot needs to be done in the next two years.	To change the standard towards: 10% within 3 years of publication of the FTAD standards and 100% within 5 years
	In general	North Sea Foundation promotes the use of Land animal byproducts in fish feed as a sustainable option. Nowadays, these byproducts are burned for 'green energy' but as long as they are safe, why not using them in fish feed. The use of Land animal byproducts is not legal in every country and some supermarkets do not like the idea of 'feeding a cow to a fish' but we as a standard for sustainability in aquaculture can say that this is	To add : The SAD does not preclude the use of land animal byproducts in fish feed. These standards assume that feed producers are following relevant regulations around food safety when incorporating land---animal by---products into feed. Retailers or importing countries remain free to formulate their own standards in relation to use of land---animal byproducts in feeds (see also FTAD).

		something we promote as being sustainable. NB: NSF doesn't understand why GMO is not excluded while animal byproducts is not discussed in the standard.	
Principle 5	Indicator 5.1.3		% of dead fish removed and disposed of ***on a daily basis***
	Criterion 5.3	The SAD needs to act as a driver away from the chemical arms race that is sea lice treatments. As this is written it allows the use of another sea lice treatment chemical when resistance is built up to another. It should be encouraging the development and use of non-chemical sea lice treatments such as strategic siting, bioemitters, cleaner wrasse and pheromone use.	5.4.3 The use of a non-chemical sea lice treatment regime to support and prevent resistance development to conventional sea lice treatments. Within 1 year of SAD publication.
Principle 6			
Principle 7			
General comments		It is essential that cross cutting issues from each of the dialogues are normalized and checked for consistency. It will only serve to weaken the whole ASC process if the same issues are dealt with in different ways across the whole of the dialogue standard development process.	

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
Principle 1			
Principle 2			
Principle 3	8.5 & 8.6 & 8.7	There is a loophole here and I suggest that these are combined a reworded. What about a loss of up to 199 fish, which can happen on a regular basis and are due to know cause of escape? These kind of escapes are permitted as the standard current stands. A count of 200 fish (per episode) or 300 (per production cycle) is meaningless when you have an accuracy requirement of >= 98%. In a net pen containing 50,000 fish 2% is equal to 1000 fish.	Suggest a stronger focus on daily net inspection, correct installation of equipment, employee training as part of an induction package before working on site, robust netting and regular net changes.
Principle 4			
Principle 5			
Principle 6			
Principle 7			
General comments			

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 1: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14 2011.

*Name: Erik Sterud
*Organization/Company: Norwegian Salmon Rivers
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2	2.1.2	The indicator refers to sampling methodology outlined in Appendix I subsection1. This subsection refers to grab sampling. A sampling method that is only possible at soft bottoms. The principle is to conserve natural habitat, local biodiversity and ecosystem function. The indicator's intention is to reveal any significant change in the faunal index score, as a result of the farming activity. Thus the indicator cannot be directly linked to a methodology that is designed only for soft bottoms.	Two possible solutions: 1. The indicator should not be linked to any sampling methodology at all 2. The indicator is linked to sampling methodologies both for soft bottoms and hard bottoms
	2.2.3	It should be clearly expressed that the reference site should be outside the AZE, and be a site that is not under direct influence from human activity.	…reference site outside AZE, and without any direct influence from human activity.
	2.4.1	This indicator has been extended since version 1. It is described in appendix I	The standard should define how many site specific key species that should be defined for

		subsection 3 that the identification of proximity to critical, sensitive, or protected habitats and species, should include identification of key wild species around the farm. This is important! However, it should clearly be stated that the farm should document the effect on these key species. The standard should then define limits for acceptable effects. It is not satisfactorily that a farm only needs to describe strategies and programs to minimize or eliminate identified impacts, without defining the maximum allowable impacts.	each farm, and maximum allowable negative impacts on these species. Suggested text in Standard: maximum allowable impact is < x% reduction in the abundance of n species and/or < y% reduction in number of species x, y and n should be defined by expert biologists.
Principle 3	3.1.1	The component in ABM saying that the vast majority of the production in any given area must participate in ABM for the scheme to be effective is appreciated. We would, however, like to see the justification of 80 % as the limit for "vast majority".	
	3.1.7	The maximum on-farm lice levels should be defined as site specific maximum allowable lice numbers in total, based on lice levels on farmed fish, monitoring of wild fish, and other available scientific data. If available data show that the threshold of 0.1 lice/g fish is exceeded in an area, the total number of farmed fish and lice, must be evaluated, and not only the mean infection levels. An example: the infection pressure of 20 mill farmed fish with 0.1 lice each is 100 % bigger than the infection pressure from 10 mill fish with 0.1 lice each. Mean lice levels cannot be used in area where the production is increasing every year.	The standard should incorporate any changes in the total number of farmed fish in an area. 0.1 lice per farmed fish could be used as a basic value, but this value should be multiplied with the increase in total production over the last x years. Thus, if an area has experienced a 50 % increase in production, maximum on-farm lice levels should be 0.1 x 0.67 = 0.067 lice per fish. A doubling of production would then allow only 0.05 lice per fish.

	3.2.1.	The indicator has been changed compared to version 1. Why are the requirements to no negative impacts removed? The total idea of the SAD standard is to ensure responsible salmon farming. If the use of non-indigenous species has proved to have negative impact on the environment, further use should not be allowed.	
	3.4.1 and 3.4.2	It is not clear if escapees are only defined as fish being lost in escape episodes. As long as there is a limit of 300 escapees per production cycle, the number of escape episodes should be irrelevant.	3.4.1 is deleted and the text explaining the exception is moved to 3.4.2
	3.4.3	It is not acceptable that 10.000 fish out of every half million stocked can disappear without notice. 98% accuracy is too low. In Norway alone 250 million fish is stocked every year. The suggested 2 % acceptable inaccuracy allows 5 mill fish to escape without notice. This is 10 times the number of wild salmon returning to spawn in Norwegian rivers annually. It is no problem counting 100 or 1000 fish with 100 % accuracy. Bigger numbers should not be problematic either. Of course it is a question of time and other resources, but these concerns belong only to the fish farmers..	The accuracy should be at least 99.9 %
	3.4.4	Ideally the loss code “unexplained losses” should not be used and any unexplained losses should be among the escapees. Fish do not just disappear. If unexplained losses are kept, the standard should define maximum acceptable annual variation in the number of unexplained loss, so that this code is not used to cover escapees. Escape numbers from Norway show that the	Maximum allowed annual variation in unexplained loss is x %. X is to be decided.

		numbers of unexplained loss increase in years with a marked decrease in escape numbers and vice versa.	
Principle 4	New indicator 4.8.1	Production losses that are too high indicate that the use of water and/or land resources is not environmentally efficient. A new indicator should define maximum allowable loss during one production cycle	Mean losses per production cycle during at least two of the previous three production cycles should be less than x % X to be decided, 5-8 is suggested.
	New indicator 4.9.1	Indicator: Documentation of a thorough evaluation of technological possibilities when equipment is replaced, with special emphasis on possibilities for closed containment systems, and a clear biologically based justification for the chosen alternative. If this indicator fits better under any other principle, please move to correct position.	Standard: 4.9.1Yes
Principle 5	5.1.5	It is way beyond acceptable from welfare reasons that 1 of every 5 stocked fish is allowed to die before slaughter. It is a part of the fish biology the number of offspring is high to compensate for high natural mortality. Nevertheless, when man domesticates wild animals they are taken under our protection and care. 20 % is way beyond what would be acceptable for any other farmed species. The best producers operate with significantly lower mortality. Best practice should be a guideline.	See new suggested indicator 4.8.1
	5.1.6	Principle 5 is dealing with disease and parasite management. Unexplained mortality should not be a part of this. If fish is dead from disease or parasites, there is an explanation for the mortality. Place under right principle.	

		It is not understood whether unexplained mortality is the same as unexplained loss mentioned in 3.4.4 In any case, unexplained mortality of 40 % of total mortality is too high, even if post mortem analyses do not indicate any specific disease agents, the mortality should be explained with histology results or other analysis results.	
	5.2.9 new indicator	Percentage of chemicals and therapeutants that are allowed to be used in/on fish after regular application and regular approval by national medicines agency in the land of use.	100 %
	5.3.2	Results of bio-assay tests should be easily public available.	
Principle 6			
Principle 7			
General comments		As in version 1, the concerns for native salmon with respect to effects of diseases and genetic effects of escapees, are the direct cause for not allowing smolt production in net pens in water bodies with native salmon. Production in marine grow-out facilities in water bodies with native salmon runs exactly the same risk for negative impact on wild fish. Perhaps even greater risk due to the higher biomass and the fact that the dissemination potential is higher in marine environment (stronger currents, more wind etc.). The biological arguments are the same. The only arguments that can be used against banning open net pen systems in marine grow-out facilities in areas with native salmon are economic arguments.	

		This is not satisfactorily for a standard for responsible salmon aquaculture.	

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION (SECTION 8 of document)

Indicator/Standard (e.g., 8.4 or 8.22)	**Comment(s)**	**Proposed solution or amendment**
8.24	We applaud that the concerns related to open smolt production, such as disease transmission and the genetic effect of escapees have been highlighted as particularly important in regions where native salmonids exist, and that the SAD standard therefore allow only closed or semi-closed smolt systems to be certified under the SAD standard in areas of wild salmonids.	
General comments on smolt standards		

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General comments on the draft standards for Responsible salmon aquaculture

Norwegian Seafood Federation (FHL) has reviewed the last draft standards for responsible salmon aquaculture. We are satisfied that some of our comments to the previous version are taken into account, but we still have a number of comments on the current edition of the standard.

Comments and suggestions for changes of specific criteria, indicators and standards are presented in the "Comment form of Draft Salmon Aquaculture Dialogue Standards" attached.

In addition, FHL also this time has some general comments on main issues. Some of these issues were also discussed in our previous comments to the first draft standards (Sept 2010). However, we still find that several of these are so important, that we want to emphasize them again, along with some new comments.

General comments:

1. As salmon farming is seafood production, and measures to ensure social, economical and environmental sustainable production shall be science-based, there is a need to assess the general framework of all food production also when a standard like the present one, is drafted.

It is not sufficient to permit ***"the industry to remain economically viable"*.** Economic sustainability also means to make it possible to ensure food security by producing enough food being affordable for the majority of the consumers. This issue is discussed in detail in our previous comments (Sept 2010) and we would like to refer to and reiterate our arguments pointed out there.

2. As observed several places in the current draft there seem to be proposals for measurements ("indicators") where it is difficult to see that any of the major elements of risk analysis has been carried out properly, and this relates to lack of a scientific risk assessment as well as analysis of the expected effect and the practical consequences of each of the proposed indicators. This was the other major objection to the proposed draft that we pointed out in our previous comments (sept 2010), and that we would like to refer to and reiterate for this draft as well.

3. As far as we can see, the standard requires that all indicators / standards must be fulfilled 100% at any time. This is very challenging demand, and we can not see that this will encourage a continuous improvement of the facilities that are certified. We also question the fact that there seem to be no period of improvements if deviations are detected during or after a certification. We assume, however, that this must be a natural part of the certification process and the general provisions for holding a certificate. It is also essential that the first revision of the final standard takes place shortly after it is adopted (1-2 years), to make sure that practically impossible or inappropriate demands can be removed or changed as quickly as possible.

4. In general we can not support the requirement that a number of production data must be entered and proactively posted on a website or similar. We see no justification of these provisions. We agree that the public, researchers or others who need it, should get access to data. But data required by the standard to be available, must be requested to the individual company. It then must be expected, on the other hand, that the company has such data readily available for delivery when requested. In this way the company is given the opportunity to comment on current data to avoid data being misinterpreted, to avoid that data obtained in different ways are wrongly compared, or to prevent that the data be misinterpreted and used indiscriminately.

Conclusion:

Based on the above mentioned concerns, the Norwegian Seafood Federation still can not support the entire current draft standard.

However, the Norwegian Seafood Federation can see that a standard that makes it achievable for the Norwegian salmon industry to document to the market the environmental sustainability of their production, might be important in the future. The current draft standard can be considered as a step in the process to develop such a standard. On this basis, we have prepared a set of more specific comments and proposals to amend the draft the aim being to eventually make the standard creditable also for the members of our organisation who want to consider certification.

The current comments and suggestions must be considered as examples of our major concerns regarding also the second draft. What we have not commented, are the texts in the reasoning for the suggested indicators and standards.

Specific contribution to the standard:

1. Different standards must be harmonized
There are some areas in the proposed standard for salmon farming, where the requirements are different than the corresponding Dialogue standards developed for other fish species. FHL is of the opinion that the different standards must be harmonized as far as possible, to avoid there being important aspects with different requirements for different fish species. Different requirements may distort competition even among different fish species.

Some examples of important aspects that should be harmonized in the different standards:
1.1.5 Requirements for the "List of therapeutants used in the production"
2.4 Requirements for the "interaction with critical or sensitive habitats and species"
2.5 Requirements for the "interaction with wild life, including predators"
3.2.1 Requirements for the "introduction of non-native species"
4.6.3 Requirements for "Energy consumption and greenhouse gas emissions on farm"

2. The standard must be achiveable.
FHL believes that the standard should be at a level where the industry must strive to achieve the requirements so that they contribute to a positive change (continuous improvement) in the areas that the standard covers.

At the same time FHL is concerned that the standard should not be so strict that it becomes unattractive or so unachievable that just very few farmers want to or are able to use the standard. This could result in an insufficient certified volume, but also lead to the standard becoming only a small contribution to the advancement of the industry. A wider entrance will help to ensure that the scheme is real, and that there is a sufficient volume. We refer to the MSC, a standard which set strict policies for the certification, so strict that it was not conducting any certification of fish stocks, and therefore was not possible to obtain a quantity that made the certificate commercially attractive. Later revisions have resulted in changes that have contributed to the MSC being used to a greater extent.

Experience from the MSC, Globalgap etc. suggests that a significant amount (critical mass) of the total amount of produced quantities of salmon and trout from aquaculture must run through the scheme to achieve a good market drive, making the scheme robust. The alternative probably is the scheme not becoming a great demand in the market, and at best just becomes a mechanism for a very narrow market.

3. Evaluation of audit ability
FHL has engaged Essentia, an independent third party certification agency which has audited a production site based on the present draft standards. We like to point out that the audition is carried out at just one sea site belonging to one Norwegian company. Unfortunately, there was not enough time or capacity to carry out an audit at a smolt center.

The purpose of the audit was to verify the audit ability, rather than the appropriateness of the standard. This means that even if the auditor has found that an indicator is audit able, members of FHL might have found the same indicator inappropriate, or not achievable in practical life. Examples of such requirements are indicator 2.5.3, 3.1.8, 4.7.1 and 5.2.2.

Attached is a report on the evaluation of audit ability, as well as a comment form.

Important comments in the evaluation report are:

- The standard is using key performance indicators, that in some cases require results based on a period of time, and in case of any non-conformances, the closing period and verification of the corrective actions would be difficult
- The audit will be very costly due to the fact that that verification of results in some cases will require a long audit time, and the challenge of gathering sensitive personal information.
- The impression is that the audit against this standard in some cases is more an investigation than an audit in an ISO context.

4. Appendix 2
Several of our comments relate to appendix 2. The appendix has to be revised in accordance with final scope and standards.

5. Raw materials that are categorized as sustainable must be possible to use by industry.
In connection with the criterion 4.2, the standard takes an important discussion about whether fisheries certified as sustainable will be utilized, or whether there are social implications of the use of industrial fish. It should be noted that the central issue is whether the resource is harvested legally and whether it is harvested from stocks that are sustainable.

Today few industrial fisheries are MSC certified, and for each fishery that is certified, it is also necessary to certify the value chain. At least during the transition period it must be flexible solutions that ensure progression. IFFO-RS should be equal with the MSC, at least during the transitional period of 5 years.

Best regards

Norwegian Seafood Federation

Aina Valland (sign) Director of Environmental issues	Brit Uglem Blomsø Advisor Environmental issues

Attachments:

1. Comment Form with comments on specific points in the standard
2. Report from evaluation
3. Evaluation of audit ability

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 1: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14 2011.

*Name: Aina Valland
*Organization/Company: Norwegian Seafood Federation
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1	1.1.2	The indicator is unmanageable, and there is a need for simpler methods. An auditor approved accounts should be sufficient. This will be described in detail in the company's annual report.	It should be adequate with the corporate annual report, and if it is done electronically it should be sufficient to send the link to the annual report.
Principle 2	2.1	Rationale says "an annual analysis using a benthic faunal index……" This does not correspond to appendix 1 ss 1.	Should be changed to : "an analysis during peak biomass production per production cycle at the site using…."
	2.2.3	The proposed indicator raises several important questions that need to be clarified. Emissions of N and P on a site will for example depend on point of time of the production cycle, season of the year, if there are any other emission sources close to the site and on the current conditions at the site at any time. The significance of the emissions will also be influenced by other	We can not see that this is an appropriate indicator that will provide reliable information on the site or on its carrying capacity, and suggest that the indicator is removed.

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
		hydrological and topographical conditions at or near by the site. Is the farm sited in a wide fjord, at the coast, or in a small fjord with little water exchange? IMR has previously assessed and found these parameters difficult to use as parameters for monitoring emissions from aquaculture. We therefore also question the appropriateness of analyzing these parameters. Are there methods or instruments that can be used and that have proven reliability?	
	2.4.2	The standard can not be 'none'. It should be ok for a farm to be sited in a protected area or in a HCVA, as long as the competent authorities consider the activity does not negatively impact the core reason that an area has been identified as HCV, or that the environmental impacts are compatible with the conservation objectives of the HCVA designation.	We suggest that the indicator is removed. The topic is covered by national regulations.
	2.5.3	We agree that the goal must be that the number of mortalities of endangered or red-listed marine mammals or birds on the farm is zero. On the other hand accidents may happen, and the standard should encourage frankness with unwanted incidences, and allow for example one lethal incident over the last 2 or 3 generations; providing appropriate actions are taken to prevent future incidents.	New standard: Maximum one incident over the last 2 generations might be accepted provided the farm can demonstrate that appropriate actions have been taken to avoid future incidents.
Principle 3	3.1.1	Principle 3 concerning diseases is in general out of the scope of this standard as economical sustainability is nor included in the scope (yet) In the ”Rationale” there is no information that substantiate (lack of proper risk analysis) that diseases in general have any significant impact on wild species	Participation in an area-based scheme for managing sea lice.

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
		(the biodiversity) thus the proposed indicators are not relevant and disproportional. Sea lice may represent a risk to wild salmonids and indicators should specifically address that risk. As we know the situation today, it is mainly salmon lice that will be of concern in relation to wild fish, and therefore should be the disease of concern in an area-based scheme. We do not have sufficient knowledge about environmental impacts of other diseases to day, and these should not be included. We therefore suggest changing the first sentence.	
	3.1.4	See general comments on publication	Weekly on-farm testing for sea-lice. Data available on request within 7 days.
	3.1.5	The indicator must reflect that the focus is on smolts passing by farms on their way out to sea. We suggest changing the indicator to emphasize this.	In areas with wild salmonids, evidence of data, and of the farm`s understanding of that data, around smolts migration routes, migration timing, and stock productivity in major waterways within 50 kilometers of the farm
	3.1.6	The requirement of this paragraph is too comprehensive for a site. R & D activity must be maintained in another way than through this standard. Proven methodology or expertise does not exist on farm level today. The intentions of this indicator are met through compliance with regulations and with several of other indicators of in this standard; including the requirement for participation in an area based scheme.	The indicator must be removed.
	3.1.7	The purpose of this indicator is to avoid sea lice negatively affecting wild salmon during smolt outmigration, and thus the trigger level must be based on how the sea lice levels in farmed salmon effects sea	Option B

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
		lice levels in wild populations, as suggested in Option B.	
	3.1.8	See general comments. Is the kind of data collection proposed here a task to maintain and operate for a certification company (ASC)? How realistic is it to build up and maintain a database like this? What are the benefits if one is not certain that all analysis results are obtained in the same way / same method and are comparable? How should the database take into account various factors that could affect test results? Is it made a reality assessment of the proposed regime (Appendix 6)	The indicator must be removed.
	3.4.3	The standard is not achievable for any Norwegian company to day. We are striving to achieve this level of accuracy, but this is not possible with the accuracy of to day's equipment; even if the spec sheet for the counting machines may say so. Preliminary results from 240 harvested pens in the EXACTUS project found on average 4,8% deviation of expected harvested numbers vs real numbers harvested, the standard deviation is large. In total the expected harvested numbers was equal to real harvested numbers. No biological factors such as mortality, size of mortalities, stocking size, stocking season or IPN increased the risk of accounting errors. Errors in number estimation at harvest therefore seem to be associated with counting errors at time of stocking or grading. Improved counting technology seems to be necessary	Proposed new standard: $\geq$ 95% on average. Improving to $\geq$ 98% within 5 years of the publication of the SAD standard.

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
		to reach the proposed 2% accuracy target. Developers of new technology suggest an average accuracy +/- 2% with an associated standard deviation. Installation of new technology and proper use of such technology will need some time.	
	3.4.4	We agree that a farm must have a full overview of this information at any time, and be able to inform on short notice on request. This is information that should not be posted on a website or similar.	Estimated unexplained loss of farmed salmon must be known, and the farm must be able to inform (anyone) on request.
Principle 4	4.2	These requirements in terms of values are set in a manner acceptable to the industry, but it should be noted that the central issue is whether the resource is harvested legally and that is harvested from stocks that are sustainable. The requirements provided are justified on the basis of socio-economic considerations that should not be included in a standard that shall ensure environmental sustainability. Therefore, should the indicator be removed.	The indicator must be removed.
	4.3.1	There is acceptance that we have ambitious goals in a five-year perspective. At the same time, there is reason to point out that today there are only carried out the MSC certification of about 10% of consumer fisheries, and that it is even a smaller percentage which can make use of the MSC label. This is because using the MSC label requires certification of the whole value chain from boat to market in addition to the certification of the fishery itself. Today few industrial fisheries are MSC certified, and for each fishery that is certified, it is also necessary to certify the value chain. If the goal in 5 years is that there should be about 25% ASC certified fish from aquaculture, this means that	The point to be rewritten from being an indicator to be discussed in the text. Alternatively the challenges of high ambitions must be considered when the standard is revised.

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
		approximately 15% of the world's fishing industry must be MSC certified and that all of the value chain is MSC certified. If 100% shall be ASC certified, it means that 59% of the world's fishing industry must be MSC certified during the upcoming 5-year period. This ambition may be difficult to achieve. It could also be problems associated with limited access to and capacity in certification agencies, which we have seen in connection with the MSC certification of various fisheries. The result has been delays in the certification process, and that the certification is time-consuming. Careful reviews must be conducted on the realism of this requirement.	
	4.3.2	This is a transitional arrangement until Section 4.3.1. is in place. During the transition period it must be flexible solutions that ensure progression.	During the transitional period it should be sufficient that the fish score is reported, but not necessarily fish score 6 and 8. IFFO RS should be equal with the MSC, at least during the transitional period of 5 years.
	4.3.4	The term "vulnerable" the way it is worded here gives an erroneous interpretation. It is therefore necessary to clarify the concept. Eg. Gadus morhua is described in different contexts as vulnerable. This despite the fact that the North Atlantic cod stocks are very well managed and that it is historically strong.	The must be a note describing the term "Vulnerable", and the understanding should be based on IFFO-RS: “Records of the above must maintained. 4.1.5 This fish by products must not come from a species listed under the following categories on the IUCN Red list (www.IUCN.org) • Extinct

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
			• Critically Endangered • Endangered 4.1.6 Species that appear on the endangered list that can be scientifically proven to be from discrete sub populations, which are not considered on the above list, may be eligible for approval subject to qualification approval by the IFFO RS standard certification committee. 4.1.7 Species that are listed as vulnerable etc. are eligible for use as by-product, as long as the fishery surveillance conducted by the certification body confirms that there is a fishery management plan in place to control the fishery."
	4.4.1	There is a need to clearly state who can create a moratorium.	The word "recognized" should be replaced with the word "official".
	4.6.3	This is one of the points where there is a need for harmonization of standards. Documentation requirements for salmon are stricter than for other species.	It is positive with a deadline of tree years, but it must be a harmonization in all standards. Alternatively taken out of the standard for salmon.
	4.7.1	The importance of Cu as having environmentally harmful effects is reduced in recent years. In 2009, Cu in Norway was taken out of the government's list of priority substances with environmentally harmful effects, partly because one has found that Cu does not accumulate in the food chain (ref: KLIF). The toxicity of Cu in seawater is low. Although the continuous ongoing research to find	The indicator must be removed. • A net that is previously treated with copper but washed at an on-land net-cleaning site without a new treatment, must be considered as untreated. • Washing of nets treated with Cu must be allowed during production

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
		satisfactory alternatives to the use of Cu in antifouling, the farmers still have to use CU as an antifouling agent in some areas and for some time till better alternatives can be chosen. This is done to achieve clean nets, good fish welfare, less risk of disease and optimum conditions when using wrasse in the fight against lice. Nets with antifouling tend to be better situated in the sea, which reduce the risk for escapes. We therefore propose to remove this indicator since keeping it could lead to far greater negative environmental effects than flushing of Cu-impregnated nets with high pressure. It is also important to be aware that after a net has been washed at an on-land net-cleaning site, it is very little Cu left, and only traces of Cu may be released at a site. This means that a net which has been cleaned at an on-land net-cleaning site, and is not treated again afterwards with copper, must be considered as "not treated".	• Washing at an on-land net cleaning site (where the washing will be more thorough) requires that the net-cleaning site has effluent treatment.
Principle 5	5.1	Principle 5 concerning diseases in general is out of the scope of this standard as economical sustainability is nor included in the scope (yet). In the "Rationale" there is no information that substantiate (lack of proper risk analysis) that diseases in general have any significant impact on wild species (the biodiversity) thus the proposed indicators is not relevant and disproportional. Sea lice may represent a risk to wild salmonids and indicators should specifically address that risk.	
	5.1.2	Experience in farming shows that it is sufficient with visits from fish health personnel 6 times a year at a site unless special circumstances at the site makes it necessary that such personnel will be summoned extra. In Norway we have no functional equivalent to a fish	Proposed solution: Site visits by a designated veterinarian or equivalent[65] at least every other month.

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
		health manager as proposed in the indicator, and see no need for having this function. Although note 65 protects Norwegian conditions, this should also appear in the text.	
	5.1.5	It should be made clear in the indicator that the entire site is concerned and not individual cages. It should also be made clear that that the indicator covers the entire production cycle from the reception of smolts. Single cages will under special circumstances have increased mortality, and may then exclude the entire site. In order to certify the time frame can not exceed one production cycle. The standard now being set to ≤ 20% is very demanding.	To make the indicator clearly understandable, it should be changed to: Maximum mortality rate of farmed fish on a site during the production cycle.
	5.2.2	This indicator, as formulated in the standard at the moment, is not rational and extremely demanding to follow up in practical life. National regulations are the regulations that are of relevance and therefore the regulations that should be followed up. It can not, under any circumstance be such that individual cages with fish that are treated at the smolt center can exclude an entire site from certification. If the treatment is applied to only a portion of the pens on a farm site, fish from pens that did not receive treatment must still be eligible for certification.	The indicator must be removed
	5.2.5	We would like to give a few comments that reflect the complexity of having such an indicator when it comes to sea lice: The sea louse is a parasite and a normal species in the marine environment, and has probably been so for as long as salmon has existed in the wild. This means	The farm must document that effective preventive measures are used, and / or be able to document that non-pharmacological treatments such as wrasses, mechanical deliceing or equivalent, including the use of

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
		that we neither would be able to nor would want to eliminate the sea lice. This also means that there will be natural variations in the occurrence of the sea lice, and that there are lots of different factors besides the amount of farmed salmon that determine the amount of infective sea lice in different years and different times of the year. We would also like to mention the fact that there is documentation that salmon lice have caused epidemic situations years before there were any farmed salmon, and that fishermen confirm that there was significant variations in the amount of salmon lice on wild salmon from a year to another also before salmon farming started. Holding these facts together with the fact that Norwegian regulations implies anti lice treatments at least twice a year on low action limits, and the fact that we generally strive to keep low numbers of sea lice on the farmed fish, the indicator in years with naturally lots of sea lice, may be counterproductive. The standard should not be able to bring about that certified farms have problems with compliance with regulations or coordinated measures, included treatments, in an area based management. We propose to change the indicator in a way that encourages greater use of preventive measures and control of lice with non-chemical measures.	H_2O_2, is chosen as part of their treatment program in order to reduce the use of antiparasitic agents. Standard: Yes
	5.3	The criterion 5.3 is about resistance of parasites, viruses and bacteria to medical treatments. The indicators and Rationale deals with sea lice.	Change the criterion: Resistance of parasites to medicinal treatments
	5.3.2	Harvesting will not always be possible or advisable. We propose to change the indicator.	When bio-assay tests determine resistance is forming, use of an alternative, permitted treatment

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
	5.4.3	It must be noted that this requirement should only apply to diseased fish. Furthermore, it must be possible to have exemptions on certain parts of the trip, (determined safe places for open wells/ water exchange) These exemptions must be determined in collaboration with and assessed by certified fish health personnel. If the indicator is to be maintained unchanged, there must be a transitional period making sure that sufficient equipment can be in place to ensure the animal welfare.	Proposed new standard: 100 % where such transport involves moving fish across management areas, within 5 years of publication of the SAD standards.
General comments	Appendiks 2	Several of our comments relate to the Appendix 2. The Appendiks has to be revised in accordance with final scope and standards.	

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
Principle 3	8.7	This is a challenging indicator and standard. When during the production cycle will the standard apply from? The number of eggs is from the start not as accurate as the standard requires because the eggs are delivered by litres, and the egg number is based on samples. The first count of fish is also very	Proposed new standard: $\geq$ 95% on average. Improving to $\geq$ 98% within 5 years of the publication of the SAD standard.

		uncertain because the fish are so small. One can approach the standard in connection with the count at vaccination and if the mortality is low to moderate. Beyond this, we must do the same assessment as was done by point 3.4.3. This is equally relevant here: The standard is not achievable for any Norwegian company to day. We are striving to achieve this level of accuracy, but this is not possible with the accuracy of to day's equipment; even if the spec sheet for the counting machines may say so. Preliminary results from 240 harvested pens in the EXACTUS project found on average 4,8% deviation of expected harvested numbers vs real numbers harvested, the standard deviation is large. In total the expected harvested numbers was equal to real harvested numbers. No biological factors such as mortality, size of mortalities, stocking size, stocking season or IPN increased the risk of accounting errors. Errors in number estimation at harvest therefore seem to be associated with counting errors at time of stocking or grading. Improved counting technology seems to be necessary to reach the proposed 2% accuracy target. Developers of new technology suggest an average accuracy +/- 2% with an associated standard deviation. Installation of new technology and proper use of such technology will need some time.	
Principle 5	8.13	The indicator is challenging. Having discussed this point with an experienced aquaculture veterinarian, it seems for many	We suggest to remove the indicator: The indicator is covered by 8.11.

		diseases to be uncertainty about the relevance and the nexus of cause and effect. And what should the consequences of a positive test be in such cases? The indicator should only include diseases which the authorities deem to be relevant in this context along with an assessment by the supervisory veterinarian of the relevance and need for testing beyond this.	
	8.15	National regulations must be followed up. Traceability information from the smoltcenter to the grow-out site will include information of all therapeutic treatments used (8.14).	We suggest to remove the indicator, or to amend it: Allowance for use of therapeutic treatments that include antibiotics or chemicals that are banned in the producing country. Standard: none
Additional requirements	8.24 and 8.25	Production of smolts in net pens must be allowed. This should not be a problem as long as the production is approved of by national authorities, including the authorities responsible for environmental issues / giving discharge permit, and as long as they have ongoing environmental monitoring to meet strict requirements.	Indicators must be removed. Only one production site per waterway / water source. Environmental monitoring to meet established requirements.
	8.29 and Appendix VII	It seems as if some of these parameters are not very well fit. Several of them say little about the operation or environmental issues, and several of them will be handled in emissions permits.	Should be revised
General comments smolt standard			

Bergen; 10.6.2011, Kari-Anne Lenvik and Trude Ordemann, Essentia AS

Principle	Criterion	Indicator	Standard ver 1	Revised ver 2	Auditable		If Yes; how?	If no; why?	Comments	Results from trial audit	
		Revised text in red			Yes	No				OK, NC, N/A	Comments given from the audited site
PRINCIPLE 1: COMPLY WITH ALL APPLICABLE INTERNATIONAL AND NATIONAL LAWS AND LOCAL REGULATIONS											
	Criterion 1.1: Compliance with all applicable local, national and international legal requirements and regulations										
		1.1.1 Presence of documents demonstrating compliance with local and national authorities on land and water use	YES		Yes	No	License documents and copy of or access to relevant legal requirements. Evaluation of compliance if the company is certified against ISO 14001 or OHSAS 18001.	It is a requirement that the auditor must verify 5 years back in time to confirm any violation against legal requirements. This type of investigation could take a lot of time depending on the availability of such information. Must be based on trust and conscientious-ness from the audited company. It is also required to check compliance against legal requirements that are stricter than this standard.		OK	Documentation such as copy of the license is available on site and can be verified. Old documents and records are centrally stored, only information of the present generation is available on site.
		1.1.2 Presence of documents demonstrating compliance with all tax laws	YES		Yes	No	Confirmation from certified public accountant, annual accounts, Certificate of Registration, copy of or access to relevant legal requirements. If relevant copy of report from tax audits.	It is difficult to verify this on site, information is centrally stored.		Not verified	All information is centrally stored and will not be possible to verify on site. Legal records is stored for 10 years.
		1.1.3 Presence of documents demonstrating compliance with all relevant national and local labor laws and regulations	YES		Yes		Appointment contracts, records of working hours etc. Copy of or access to relevant legal requirements. Verification of site and routines (HES).			Partly OK	Production results that conforms compliance with legal requirements are stored on site. Information of working hours etc. is present in the administration site.
		1.1.4 Presence of documents demonstrating compliance with regulations and permits concerning water quality impacts	YES		Yes		Discharge consent and records verifying that the requirements have been adhered to.			OK	Documentation available on site and can be verified
		1.1.5 Presence of documents demonstrating that the farm has provided the buyer of its salmon a list of all therapeutants used in production. ~~compliance with importing laws of countries that have received products from the farm within the past 12 months~~	YES		Yes	~~No~~	Most of the companies have such information integrated in their computer based production system. A report presenting what kind of therapeutants that are used can be made (product CV)		The revision has made this clause easier to comply with; and as such an improvement.	OK	Regarding documentation for treatment, this is possible to verify for each cage and population at the site.
PRINCIPLE 2: CONSERVE NATURAL HABITAT, LOCAL BIODIVERSITY AND ECOSYSTEM FUNCTION											
	Criterion 2.1: Benthic biodiversity and benthic effects										

2.1.1 Redox potential or sulphide levels in sediment outside of the Allowable Zone of Effect (AZE) following the sampling methodology outlined in Appendix I subsection 1	Redox potential > 0 millivolts (mV) Sulphide ≤ 1,500 microMoles / l		*Yes*		As long as the sampling is based on the requirements in the standard, a report can be verified			NC regar-ding AZE	General comment from the site: Why make an AZE when ther is a NS 9410? As part of NS 9410. We have to measure pH, Eh (conductivity), MOM B or C. B is just in connection to the site. C goes a further outside the farm. This point ought to be connected to NS 9410. Sulphide is not normaly measured.
2.1.2 Faunal index score indicating good to high ecological quality in sediment outside of the AZE, following the sampling methodology outlined in Appendix I subsection 1	~~AMBI score ≤ 3.3~~	AZTI Marine Biotic Index (AMBI6) score ≤ 3.3, or Shannon-Wiener Index score > 3, or Benthic Quality Index (BQI) score ≥ 15, or Infaunal Trophic Index (ITI) score ≥ 25	*Yes*		Same as above		Same as above	OK	In connection to the NS 9410
2.1.3 Number of macrofaunal taxa in the sediment within the AZE, following the sampling methodology outlined in Appendix I subsection 1	~~≥ 2 highly abundant taxa~~	≥ 2 highly abundant taxa that are not pollution indicator species	*Yes*		Same as above		Same as above	OK	Detection of macrofauna will only be done occasional in a sediment test. Exeption can be mollusc's. This is normally not reported in the enviromental survey, maybe as an note. This is not regarded as good and relevant information.
2.1.4 Definition of a site-specific AZE based on a robust and credible modeling system		Yes, within 3 years of the publication of the SAD standard	*?*	*?*		It could be difficult to verify the stages towards this requirement. Should it be regarded as not applicable until the time limit is reached?		NC / N/A	In connection to the NS 9410
Criterion 2.2 Water quality in and near the site of operation									
2.2.1 Weekly average percent saturation of dissolved oxygen (DO) on farm	≥60%		*Yes*		Oxygen levels are controlled and records can be verified; either manually or electronic.			OK	Documentation available on site and can be verified
2.2.2 Maximum percentage of weekly samples from 2.2.1 that fall under 1.85 mg/liter DO	5 %		*Yes*		Same as above		Same as above	OK	Documentation available on site and can be verified
2.2.3 Evidence of weekly monitoring of nitrogen and phosphorous levels on farm and at a reference site		Yes	*Yes*		Monitoring results can be verified			NC / N/A	This need a special sample technigue and must be send away for analysing. Can't be done at the site. This need evaluation with som experts. Can't see that this is a critical enviromental factor for a salt sea site. For a fresh water site it is very relevant.
Criterion 2.3: Nutrient release from production									

2.3.1 Percentage of fines in the feed at point of entry to the farm (measured according to methodology in Appendix I subsection 2)	<1% by weight of the feed		*Yes*		This is the same requirement as in Globalgap standard for salmonids (SN 4.3.3). The percentage can be measured based on the description in the standard and records can be verified.			OK/NC	When feed is delivered in bulk a relevant samle will be difficult to take. The agreement with the feed company says 1,5% fines in the feed before they can claime. We can get the result from the reference sample made by the feed produser.
Criterion 2.4: Interaction with critical or sensitive habitats and species									
2.4.1 Evidence of an assessment of the farm's potential impacts on biodiversity and nearby ecosystems that contains at a minimum: a) identification of proximity to critical, sensitive or protected habitats and species, b) description of the potential impacts the farm might have on biodiversity, with focus on those habitats or species, and c) a description of strategies and current and future programs underway to eliminate or minimize any identified impacts the farm might have and to monitor outcomes of these programs and strategies (See Appendix I subsection 3 for details)	YES		*Yes*		This requirement is normally covered by comments given by relevant authorities in license documents or discharge consents. Example is denial of application for salmon farming in a special landscape area or natural reserve. This requirements has been increased, and probably they have to make their own assessment to fulfil the requirements. An assessment is possible to verify, and a the result of the system for following up programs will also be possible to verify.			OK	When the site is approved by the authorities all this documentation must be verified. Some documents are on site, the rest at the administration site.
2.4.2 Allowance for the farm to be sited in a protected area or areas determined to be of High Conservation Value (HCV)		None	*Yes*		This will not be allowed by the Norwegian Goverment as well, and as such not relevant. As a principle this can be verified by checking whether the area is a HVC area.			OK	This is one of the issues that are evaluated befor the autorities clarify and approve the site.
Criterion 2.5: Interaction with wildlife, including predators									
2.5.1 Number of days where acoustic deterrent devices (ADDs) or acoustic harassment devices (AHDs) were used	0, within two years of the date of publication of the SAD standard		*Yes*	*No*	It is possible to verify if any acoustic deterrent devices are present at the site during the audit.	Difficult to verify any earlier use if it is not logged. Same comments as for 2.1.4.		OK	Documentation available on site and can be verified
2.5.2 Prior to the achievement of 2.5.1, evidence that if ADDs or AHDs are in use, the farm is developing and implementing a plan to phase out their use	YES		*Yes*		A description of alternative solutions can be verified.			OK	Documentation available on site and can be verified
2.5.3 Number of mortalities of endangered or red-listed marine mammals or birds on the farm	0		*Yes*		Verification of weapons at site, application and records of killing		Several examples of birds (also endangered) killed by using surveillance nets to monitor the risk of fish escapes. This can still be the case	OK	We have our own report to show how many dead animals and birds that have been found. Documentation available on site and can be verified

2.5.4 Evidence that the following steps were taken prior to lethal action against a predator: 1. All other avenues were pursued prior to using lethal action 2. Approval was given from a senior manager above the farm manager 3. Explicit permission was granted to take lethal action against the specific animal from the relevant regulatory authority		YES	Yes	No	This must be based on the fact that all the steps has been recorded.	Step no. 1 could be difficult to verify	Bird nets are not an active lethal action, the purpose is to prevent fish escapes, but sometimes birds can get entangled as mentioned from the site.	NC?	We are using bird nets above the cages. 3 times the last 2 years birds have been trapped and killed.
2.5.5 Evidence that information about any lethal incidents on the farm has been made easily publicly accessible		YES	Yes		If it has been made public, this can be verified			NC	Some doubt regarding the publicity
2.5.6 Maximum number of lethal incidents on the farm over the prior two years		<9 lethal incidents, with no more than 2 of the incidents being marine mammals	Yes		If the number has been recorded, this can be verified			OK	See comments 2.5.4. In some area it can be difficult to follow up the limit, especially in the north.
2.5.7 In the event of a lethal incident, evidence that an assessment of the risk of lethal incident(s) has been undertaken and demonstration of concrete steps taken by the farm to reduce the risk of future incidences		YES	Yes		A risk assessment and suggestions for improvements can be verified			OK	The goal for the company is to produce in a way where they also take care of the environment. They don't have a concrete plan for this action. For this site it is not a problem.
~~2.6: Cumulative impacts on biodiversity~~									
~~2.6.1 Presence or absence of selected sensitive or sentinel species~~	~~Not defined~~								
PRINCIPLE 3: PROTECT THE HEALTH AND GENETIC INTEGRITY OF WILD POPULATIONS									
Criterion 3.1 Introduced or amplified parasites and pathogens									
3.1.1 Participation in an ~~effective~~ area-based management (ABM) scheme for managing disease and resistance to treatments that includes coordination of stocking, fallowing, therapeutic treatments, and information-sharing. ~~production levels, coordinated application of treatments, rotation of different treatments, open communication about treatment, monitoring schemes, stocking and transport.~~ Detailed requirements are in Appendix II.	YES		Yes		Participation in an area-based scheme can be verified (documented agreements). Examples are coordinated lice treatments and diseases such as PD.		The details in this requirement has been reduced, and as such easier to comply with.	NC	The site is not a part of any AMB
~~3.1.2 An assessment of key regional cumulative impacts of the farm and its neighbors, including an analysis of the appropriate density and infection pressure risk on wild populations. Specific areas that must be covered are listed in Appendix III.~~	~~YES~~						Positive that this has been removed! See comments from the previous report		

3.1.2 A demonstrated commitment to collaborate with NGOs, academics and governments on areas of mutually agreed research to measure possible impacts on wild stocks. ~~Farms located in areas of wild salmonids must focus this research on measuring sea lice levels on wild juveniles and understanding the link between sea lice levels on farms and in the wild.~~	YES		Yes	~~No~~	Can be verified by documents confirming participation in relevant projects or financial contribution. Such assessments will require scientific support and must cover larger areas such as fjords and not only the proximity of the site.			NC	Each site cannot do this alone. The documentation cannot be verfied.
3.1.3 Establishment of a maximum sea lice load for the entire ABM and for the individual farm that is based on regulatory requirements. In areas of wild salmonids, loads shall also be based on wild fish monitoring (see Standard 3.1.6) and incorporate a precautionary low maximum lice level just before and during outmigration		YES	Yes		The maximum lice level must be defined as part of the ABM and the agreement can be verified.		It is expected that this standard will not be stricter than the Norwegian requirements at present.	OK	Lice counting is done every week when the temperature is above 10 ◦C and every 14 days when the temperature is below 10◦C. There is a regulation for de-licing the fish during spring, which is the important periode for wild fish movement. Documentation available on site and can be verified
~~3.1.4 Maximum average sea lice levels on all farms in the area-based management scheme.~~	~~TBD~~								
~~*The following indicators would only apply to farms located in areas of wild salmonids that cannot demonstrate total containment or separation of parasite and disease vectors from the wild environment*~~									
3.1.4 Weekly on-farm testing for sea lice, with test results made easily publicly available within 7 days of testing.		YES	Yes	No	The requirement of weekly sampling is a legal requirement in Norway. The results can be verified on site.	The results are documented in to "Altinn" and made available for the Norwegian Food Safety Authority, but this information is at present not publicly available. To be able to verify this the companies must display them e.g by use of their own web site or other means.	See comments 3.1.3	OK	Lice counting is done every week when the temperature is above 10 ◦C and every 14 days when the temperature is below 10◦C. The lice count is reported in Altinn
~~3.1.5 Timing of wild salmonid outmigration and juvenile periods is well established and monitored~~	~~YES~~								
3.1.5 In areas with wild salmonids, evidence of data, and the farm's understanding of that data, around salmonid migration routes, migration timing, and stock productivity in major waterways within 50 kilometers of the farm		YES	Yes	No	In principle possible to verify if the company has gathered such data and present it during the audit	The possibility to gather such data could be challenging, depending on official informations from Directorate of Fisheries, recearch institutes etc.		NC	There is a regulation for de-licing he fish during springtime. This is an important periode for wild fish movement, but it is diffcult to determind the wild fish swimming routes exactly. The authorities takes some samples /surveys of the wild salmon. This can not be verified.

	~~3.1.6 Measure lice levels on wild juveniles during outmigration, as part of an area-based management plan, and in partnership with NGOs, academics and governments, as appropriate. (Note: this would be the way for these farms to meet 3.1.3.)~~	~~YES~~								
	3.1.6 In areas of wild salmonids, monitoring of sea lice levels on wild out-migrating salmon juveniles or on coastal sea trout (details in Appendix III subsection 1). Monitoring results must be made easily publicly available within 8 weeks of testing		YES	Yes	No	In principle possible to verify if the company has gathered such data and present it during the audit	The possibility to gather such data could be challenging, depending on official informations from Directorate of Fisheries, recearch institutes etc. The requirement of publication of results within 8 weeks could be out of the control of the farmer.			See 3.1.5. Are not sure if the sample is available within 8 weeks.
	~~3.1.7 Maximum average sea lice levels on all farms in the area-based management plan during juvenile outmigration (or equivalent for coastal salmonids).~~	~~Maximum 0.5 mature sea lice per fish or 3 total sea lice.~~								
	3.1.7 In areas of wild salmonids, maximum on-farm lice levels during sensitive periods for wild fish		The SC puts forward two options for review : Option A: 0.1 mature female lice per farmed fish Option B: 0.1 mature female lice per farmed fish if monitoring reveals lice levels in wild populations has exceed the thresholds described in Appendix III, subsection 2.	Yes		The lice level can be monitored and verified			OK	The threatment can be verified.
	~~3.1.8 In areas of coastal trout, maximum average sea lice levels on all farms in the area-based plan during non-juvenile periods.~~	~~TBD~~								

3.1.8 In areas of wild salmonids, evidence that the farm has submitted sea lice testing results and other data points to ASC in the template requested by ASC32		YES	Yes		Such information can be verified			OK	Documentation available on site and can be verified
~~3.1.9 Period of demonstrated compliance with standards in 3.1 prior to initial certification.~~	~~TBD~~								
Criterion 3.2 Introduction of non-native species									
3.2.1 If a non-indigenous species is being produced ~~farmed, evidence and documentation~~ demonstration that the species ~~is~~ was already widely commercially produced ~~used in commercial production locally~~ in the area by the standards release date. ~~AND, one of the following is met: A) There is no evidence of establishment or impact in adjacent ecosystems B) The species has been approved for aquaculture use by a process based on ICES code of practice on the introductions and transfers of marine organisms or comparable protocol~~	YES		Yes		This should be possible to verify. Consider as not relevant for Norwegian fish farming.		This clause has been modified, positive that A from the previous suggestion is removed; this would have been very difficult to monitor and verify	OK	This is a part of the evaluation done before the authorisation is given.
3.2.2 Use of non-native species for sea lice control or on-farm management purposes	NONE		Yes		Delivery records of wrasse used will confirm whether this is a native species or not.			OK	Are using native fish for controlling sea lice.
Criterion 3.3 Introduction of transgenic species									
3.3. Use of transgenic salmon by the farm	NONE		Yes		This should be possible to verify. Consider as not relevant for Norwegian fish farming.			OK	Can be verified if used.
Criterion 3.4 Escapes									
~~3.4.1 Percentage of fish loss during a production cycle (pre-smolt vaccination to harvest) that is unexplained by mortalities or other known causes~~	~~No more than 0.1% more than the documented accuracy of the counting machines or counting method used~~		~~Yes~~	~~No~~	-	-			
3.4.1 Maximum number of escapes episodes (defined as ~~involving~~ 200 or more fish), with the exception of escape episodes that are clearly documented as being out of the farm's control	0	0, in the most recent production cycle	Yes		Will be possible to verify since it is a legal requirement to report such incidents. Serious incidents of escapes will normally be reported to the police; and the conclusion of whether they are guilty or not will take some time. My understanding of this requirement is that in such cases the company cannot be certified until the case is clear and it is confirmed that the cause was beyond there control.			OK	Is reporting every fish escaped. Documentation available on site and can be verified

3.4.2 Maximum number of escapees in the most recent production cycle		300	Yes		All mortalities are recorded			OK	Documentation available on site and can be verified
3.4.3 Accuracy of the counting technology or counting method used for calculating stocking and harvest numbers		≥98%	Yes	No	The accuracy can be measured, but the target will be very difficult to achieve based on the counting methods and technology in use. This is highly focused in the industry, and improvements is anticipated	The total conclusion of the accuracy is measured at harvest point. If the site that are audited is in the beginning of the generation, this is impossible to verify.		OK	The generation check at the end of the production can show the accuracy of the counting based on a comparison between smolt in and the number of salmon harvested. Documentation must be verified at the administration site.
3.4.4 Estimated unexplained loss of farmed salmon is made publicly available		YES	Yes		Unexplained loss is normally discovered after harvest or splitting and counting. The system for making it public would vary, but it is possible to verify.		In the trial audit this was regarded as escapes. Unexplained loss is not necessarily escapes, and not reported as such.	OK	Escapes is reported to the authorities and is public available
3.4.5 Evidence of compliance with ~~national~~ relevant regulations and technical standards aimed at reducing the risk of escapees	YES		Yes		This can be verified by certificates and other documents based on NYTEK.			OK	Documentation available on site and can be verified
3.4.6 Evidence of escape prevention planning and related employee training, including net strength testing; appropriate net mesh size; net traceability, system robustness, predator management, record keeping and reporting of risk events (e.g., holes, infrastructure issues, handling errors, reporting and follow up of escape events); and, worker training on escape prevention and counting technologies	YES		Yes		Training is addedd to the revised version, this is in place for most of the companies already and can be verified. Net mesh size is also added and can be verified in net logs.			OK	The procedure and training records can be verified. Documentation is normally at the administration site, some times also at production site.

PRINCIPLE 4: USE RESOURCES IN AN ENVIRONMENTALLY EFFICIENT AND RESPONSIBLE MANNER

Criterion 4.1 Traceability of raw materials in feed

4.1.1 Presence and evidence of traceability of all raw feed ingredients with regard to country of origin ~~as demonstrated by the feed producer~~ and of a certified chain of custody to the level of detail needed to meet the standards under Principle 4	YES		Yes		Can be verified, based on the two alternatives described in the standard. If the standard requires third party assessment, a certificate can be verified.			OK	Needs access to database for the feed company. Must discuss the origin with the feed producer. Documentation from the feed producer

Criterion 4.2 Use of wild fish for feed

4.2.1 Fishmeal Forage Fish Dependency Ratio (FFDRm) for grow-out (calculated using formulas in Appendix IV, subsection 1)	~~<1.31~~	<1.35	Yes	?	This is depending on information from the feed suppliers			OK	Documentation from the feed producer
4.2.2 Fish oil Forage Fish Dependency Ratio (FFDRo) for grow-out (calculated using formulas in Appendix IV, subsection 1), OR Maximum amount of EPA and DHA from direct marine sources (calculated according to Appendix IV, subsection 2)	~~<2.85~~	FFDRo <2.95 or (EPA + DHA) < 30 g/kg feed	Yes	?	Same as above			OK /NC	Can not evaluate the value. This can be done together with the administration and the feed producer.
4.2.3 Protein Retention Efficiency (PRE) for grow-out (calculated using formulas in Appendix IV, subsection 3)		≥35%	Yes		Same as above			OK/NC	Can not evaluate the value. This can be done together with the administration and the feed producer.

~~4.2.3 Fish Protein Index (FPI) for grow-out (calculated using formulas in Appendix IV, subsection 2)~~	~~80% prior to January 2014 and >100% as of January 1, 2014~~								
Criterion 4.3 Source of marine raw materials									
~~4.3.1 Commitment to source feed containing >90% fishmeal or fish oil originating from fisheries certified under an ISEAL member's accredited sustainability certification scheme. This must be done as the product becomes available and within 5 years of the publication of the SAD standards.~~	~~YES~~								
4.3.1 Timeframe for all fishmeal and fish oil used in feed to come from fisheries certified under a scheme that is ISEAL accredited and has guidelines that specifically promote responsible environmental management of small pelagic fisheries		<5 years after the date of publication of the SAD standards	*Yes*	*No*	This clause will be N/A until dead-line. Could be possible to verify that the feed suppliers have a defined strategy to meet this target.			OK/NC	Documentation from the feed producer
4.3.2 Prior to achieving 4.3.1, the FishSource score for the fishery(ies) from which all marine raw material ~~a minimum of 80% of the fishmeal or fish oil~~ in feed ~~is~~ is derived. (See Appendix IV, subsection 4 for explanation of FishSource scoring.)	~~TBD~~	All individual scores ≥6, and biomass score ≥8	*Yes*		This is depending on information from the feed suppliers			OK/NC	Documentation from the feed producer
4.3.3 Prior to achieving 4.3.1, demonstration of chain of custody and traceability for fisheries products in feed through an ISEAL accredited or ISO 65 compliant certification scheme that also incorporates the FAO Code of Conduct for Responsible Fisheries	YES		*Yes*	*?*	Certification of fisheries based on MSC or other schemes can be verified, but the amount of raw material will be limited. Information must come from the feed supplier			OK/NC	Documentation from the feed producer
4.3.4 Feed containing fishmeal and/or fish oil originating from by-products or trimmings from IUU catch or fish species which are categorized as vulnerable, endangered or critically endangered, according to the IUCN Red List of Threatened Species	NONE		*Yes*	*?*	Information must given from meal and oil producers to feed suppliers and further to aquaculture companies			OK/NC	Documentation from the feed producer
Criterion 4.4 Source of non-marine raw materials in feed									
4.4.1 Presence and evidence of a responsible sourcing policy for the feed manufacturer for feed ingredients which comply with recognized crop moratoriums and local laws	YES		*Yes*	*No*	Can be verified by a statement from the feed supplier. Aquaculture companies must verify the quality of the statement through traceability test of the origin of the raw materials	Verification of compliance with recognized crop moratoriums and local laws can be a challenge.		OK	Documentation from the feed producer
4.4.2 Documentation of use of transgenic plant raw material, or raw materials derived from genetically modified plants, in the feed	Yes, for raw materials containing more than 1% transgenics		*Yes*		Can be verified by GMO certificates			OK	Documentation from the feed producer
Criterion 4.5 Non-biological waste from production									
4.5.1 Presence and evidence of a functioning policy for proper and responsible treatment of non-biological waste from production (e.g., disposal and recycling)	YES		*Yes*	*No*	Can be verified by agreements for recycling of scrapped equipments (nets, cages, pipelines etc.) or action plans to ensure a sufficient handling.	Disposal of such equipments to unoffical channels such as farmers, local fishermens etc are not easy to verify		OK	They have environmental targets, but not detailed for waste. This was a target in 2010.

4.5.2 Evidence that non-biological waste (including net pens) from grow-out site is either disposed of properly or recycled	YES		*Yes*	*No*	Same as above	Same as above		OK	Can document waste, net pens and metal.
Criterion 4.6 Energy consumption and greenhouse gas emissions on farm									
4.6.1 Presence of an energy use assessment verifying the energy consumption on the farm and representing the whole life cycle at sea (see Appendix V subsection 1 for guidance and required components of the records &	Yes, measured in kilojoule/mt fish/production cycle		*Yes*		Some assessments done, but not implemented for the majority of the industry. Can be verified (reports) when it has been done.			OK	Can't be verified today, but we can easely make such targets. Have changed from diesel aggregate to electristy.
4.6.2 Records of greenhouse gas (GHG) emissions on farm and evidence of an annual GHG assessment	YES		*Yes*		Some assessments done, but not implemented for the majority of the industry. Can be verified (reports) when it has been done.			OK	Can't be verified today, but we can easely make targets. See 4.6.1
4.6.3 Documentation of GHG emissions of the feed used during the previous production cycle (See Appendix V subsection 2 for guidance and requirement components of the assessment) ~~to produce the salmon at site of certification according to ISO-compliant life cycle assessment methodology~~	~~YES~~	YES, within 3 years of the publication of the SAD standards	*Yes*		This clause will be N/A until dead-line. Could be possible to verify that the feed suppliers have a defined strategy to meet this target.			NC	This must be done together with the feed company.
Criterion 4.7 Non-therapeutic chemical inputs									
4.7.1 For farms that use copper-treated nets, evidence that nets are not cleaned or treated in situ in the marine environment ~~Percentage of copper-treated nets that are cleaned and treated in situ in the marine environment~~	~~0 %~~	YES	*Yes*		Treating of nets on site is not allowed in Norway. Cleaning is done regularly and can be verified in records such as site dairies etc.			OK	All our nets are externally cleaned and treated. Documentation available on site and can be verified
4.7.2 For any farm that cleans nets at on-land sites, evidence that net-cleaning sites have effluent treatment ~~Percentage of nets cleaned on land that are cleaned at sites with effluent treatment~~	~~100 %~~	YES	*Yes*		Norwegian legislations, can be verified by report from supplier audits or confirmation that the company are approved by the authorities			OK	Documentation available at the administration site. Audit procedure of suppliers
4.7.3 For farms that use copper nets or copper-treated nets, evidence of annual testing for copper level in the sediment outside of the AZE (According to methodology in Appendix 1, subsection 1) ~~Copper concentration in the sediment outside of the Allowable Zone of Effect (AZE) at marine grow-out sites~~	~~34 mg Cu/kg dry sediment weight~~	YES	*Yes*		Must be done by a third party to cover next clause. Report from this assessment can be verified.			NC	Need to change routines and add this analysis to the MOM B and C test
4.7.4 In instances where the Cu concentration in the sediment exceeds 34 mg Cu/kg dry sediment weight, demonstration that the Cu concentration is consistent with reference sites and backgrounds levels ~~If the copper level in the sediment is greater than the allowed level in 4.7.3, presence and evidence of a risk assessment conducted by a qualified third party demonstrating that the copper concentration in the sediment does not represent an environmental hazard~~	YES		*Yes*		See above		Positive that it has been taken into consideration the use of a reference site as an indicator, instead of a definite target	OK	Will be a result of 4.7.3
4.7.5 Evidence that the type of biocides used in net antifouling are approved according to legislation in the European Union, or United States, or Australia	YES		*Yes*		Records from the supplier gives information on which chemicals that have been used, the fish farmer must give evidence that these are approved chemicals (data sheet etc.)		The question is mis-understood from the site; the requirement is either EU OR United States OR Australia, not all of them	OK/~~NC~~	Following the Norwegian regulation. Must add other countries. European legislation is mostly the same as Norwegian. Challenge to have knowledge on legislation in United States and Australia. This information was not available on site.

PRINCIPLE 5: MANAGE DISEASE AND PARASITES IN AN ENVIRONMENTALLY RESPONSIBLE MANNER

Criterion 5.1 Survival and health of farmed fish

5.1.1. Evidence of a fish health management plan for the identification and monitoring of fish diseases and parasites	YES		*Yes*		Globalgap requirement (Veterinary health plan). Verification of contracts with external veterinarians and records of visits from both external and internal visits.			OK	Documentation available on site and can be verified
5.1.2 Site visits by a designated veterinarian at least four times a year, and by a fish health professional at least once a month	YES		*Yes*		In Norway a requirement to have at least 6 visits per year (depending on amount and type of fish); must be extended to comply with monthly visits. Verification of reports from the visits.			OK	Documentation available on site and can be verified
5.1.3 Percentage of dead fish removed and disposed of	100 %		*Yes*		Mortalities are recorded and can be verified.			OK	Documentation available on site and can be verified
5.1.4 Percentage of mortalities ~~dead fish~~ that are recorded, classified and receive a post-mortem analysis	100 %		*Yes*	*No*	Causes of mortalities are recorded; but post-mortem analysis is normally done by the veterinarian; either as a normal procedure during regularly visits, or suspicion of disease outbreak. Can be verified in reports from veterinary visits.	Verification of 100 % post-mortem analysis is not possible.		OK/NC	Random post-mortem analysis is done. Impossible to have 100 %?
~~5.1.3 Percentage of fish that are vaccinated for selected diseases that are known to present a significant risk in the region and for which an effective vaccine exists~~	~~100 %~~								
~~5.1.4 Percentage of smolt groups tested for select diseases of regional concern prior to entering grow-out phase on farm~~	~~100 %~~								
5.1.5 Maximum mortality rate of farmed fish ~~during the previous two production cycles~~	~~≤25%~~	≤20%, during at least two of the previous three production cycles	*Yes*	*No*	The number of mortalities are recorded and can be verified.	As mentioned earlier, historic data is not present on site and must be verified centrally. A brand new site will not have any previous data, and then this requirement cannot be verified. Must also clarify incidents when the site have been fallowed for a long period (e.g more than one year).	As discussed in the report; initially before certification, all sites with higher mortality rate during the last two generations must be excluded from the list of sites to be certified.	OK	The normal mortality for this site is between 4 and 7%. Our target is no more then 10 % pr generation. Documentation available on site and can be verified
5.1.6 Maximum unexplained mortality rate from the previous two production cycles, for farms with mortality rates >6%	≤40% of total mortalities		*Yes*	*?*	Same as above	Same as above. Based on the fact that the standard require 100 % post mortem, the unexplained mortality rate will be reduced.	This has been modified to only include farms with rates above 6 %. As mentioned in the trial audit, normal rate is between 4 and 7 %. Few farms will then be excluded from this requirement.	OK	Documentation available on site and can be verified

5.1.7 A farm-specific mortalities reduction program that includes defined annual targets for reductions in mortalities and reductions in unexplained mortalities	YES		*Yes*		Verification of Veterinay health plan or other action plans.			OK	Fish Health Plan available on site and can be verified
Criterion 5.2 Therapeutic treatments ~~Contamination levels and health effects in local non-target organisms~~									
5.2.1 On-farm documentation that includes, at a minimum, detailed information on all chemicals and therapeutants used during the most recent production cycle, the amounts used (including grams per ton of fish produced), the dates used, which group of fish were treated and against which diseases, proof of proper dosing, and all disease and pathogens detected on the site	YES		*Yes*		Verification of different records that are normally present at site			OK	Documentation available on site and can be verified
5.2.2 Allowance for use of therapeutic treatments that include antibiotics or chemicals that are banned in any of the primary salmon producing countries	NONE		*Yes*		Verification of prescriptions and other documents confirming knowledge about banned chemicals (e.g. list per country)			OK	The treatment has to follow the positive list for medicines. Only the veterinary can prescribe the treatments. Documentation available on site and can be verified
5.2.3 Percentage of medication events that are prescribed by a veterinarian	100 %		*Yes*		Legal requirement in Norway. Must include fish health biologist. Verification of prescriptions.			OK	Documentation available on site and can be verified
5.2.4 Compliance with all withholding periods after treatments	YES		*Yes*		Documented in production records (e.g. Fish Talk)			OK	All treated fish must be analysed and found ok before slaugthering after a treatment. Documentation available on site and can be verified
5.2.5 Maximum cumulative parasiticide treatment index (PTI) score calculated according to the formula: Σ(Average live weight of salmon at treatment in kg)		PTI score < 6.8	*?*	*?*	This is an unknown index, but technically all calculations done can be verified			NC	For the moment there are no understanding for the PTI goal. Don't know this measurement. Not able to see if it is possible.
5.2.6 Allowance for prophylactic use of antimicrobial treatments	NONE		*Yes*		Verification of prescriptions (description of intended use)			NC	This is not allowed
5.2.7 For any use of antibiotics listed as highly important for human medicine by the World Health Organization (WHO), demonstration that a risk assessment was conducted by the veterinarian prior to prescription and application		YES	*Yes*		A risk assessment can be verified			OK/NC	This is not a focus, but it can easely be done. Can not be verified at the moment
5.2.8 Allowance for use of antibiotics listed as critically important for human medicine by the WHO	NONE		*Yes*		These antibiotics must be known (e.g. listed) and prescriptions must be verified.			NC	See 5.2.7
~~5.2.2 Allowance for concentrations of selected chemicals and therapeutants in the benthos~~	~~TBD~~								
~~5.3 Therapeutic treatments~~									
Criterion 5.3 Resistance of parasites, viruses and bacteria to medicinal treatments									
~~5.4.1 Participation in an area-based management plan (as outlined in Principle 3) that includes coordinated treatments and coordinated resistance monitoring (see Appendix II for details)~~	~~YES~~								

5.3.1 Bio-assay analysis to determine resistance when two applications of a treatment have not produced the expected effect	YES		Yes		Verification of lice counts and bio assay reports.			OK	Documentation available on site and can be verified
5.3.2 When bio-assay tests determine resistance is forming, use of an alternative, permitted treatment, or an immediate harvest of all fish on the site	YES		Yes		Verification of documents confirming alternative treatments (prescriptions) or harvesting.		The legal requirement does not require immediate harvest of all fish on the site	OK	Report will be made to the authorities, and one alternative solution could be an immediate harvest
Criterion 5.4 Biosecurity management									
5.4.1 Evidence that all salmon on the site ~~Percentage of cages or pens that~~ are a single-year class	100 %		Yes		Documented in production records.			OK	Documentation available on site and can be verified
5.4.2 Percentage of fish transferred live from one sea-based farm site to another, unless explicitly accepted by the designated veterinarian not to increase disease spreading risk	0 %		Yes		Documented in movements records. Covered by legal requirements.			OK	Some sites are moving fish between the sites. This has to stop. Documentation available on site and can be verified
5.4.3 Percentage of fish transported ~~to slaughter~~ in a closed wellboat with sea lice filtration or a wellboat with discharge treatment and disinfection	~~TBD~~	100% , where such transport involves	Yes	~~No~~	Documentation from well boat will verify compliance when the standard is defined		Sea lice filtration is added to the list of requirement, should not be a problem	OK	To day this is depending on the area where the well boat is transporting fish, but should be possible to implement.
5.5.4 If exotic diseases and /or parasites are detected on the farm or in the hatchery, evidence of increased ~~additional~~ biosecurity measures that include restrictions on movement and evidence of strong disease management practices, including culling	Required		Yes		Verification of reports from veterinarians. Documentation of restrictions given; either internally or by authorities such as Mattilsynet.			OK	This is highly focused and will be reported to the authorities. Documentation available on site and can be verified
~~5.5.5 Re-occurrence of a specific disease over more than one generation~~	~~TBD~~								
PRINCIPLE 6: DEVELOP AND OPERATE FARMS IN A SOCIALLY RESPONSIBLE MANNER									
Criterion 6.1 Freedom of association and collective bargaining									
6.1.1 Evidence that workers have access to trade unions (if they exist) and union representative(s) chosen by themselves without managerial interference	YES		Yes	?	Verification of this clause is easier when the labourer is organized. Verification of policy documents, labour contracts, minutes from meetings concerning this matters and interview of employees.	If the labourer is not organized, this can be a sensitive question to ask.		OK	Documentation available on site and can be verified
6.1.2 Evidence that workers are free to form organizations, including unions, to advocate for and protect their rights	YES		Yes	?	Same as above	Same as above		OK	Following the rules between the labour and leaders Can be documentet at the administration site
6.1.3 Evidence that workers are free and able to bargain collectively for their rights	YES		Yes	?	Same as above	Same as above		OK	Difficult to document, they have to be member of an labor organisation
Criterion 6.2 Child labor									
6.2.1 Number of incidences of child labor	NONE		Yes		Child labour is per definition in Norway employees under the age of 13. Verification of the list of employees and their age. Can also be based on interviews in case of suspicion.			OK	Documentation available on site and can be verified

6.2.2 Percentage of young workers that are protected	100 %		Yes		Young workers are defined as children between 15-18 years old. Requirements covered by Norwegian legislation. Compliance can be verified by the list of employees and their age, labour contracts,time sheets per employee and interviews.			OK	Some under education can be below 18 yeas. Called TAFF. Documentation available on site and can be verified
Criterion 6.3 Forced, bonded or compulsory labor									
6.3.1 Number of incidences of forced, bonded or compulsory labor	NONE		Yes	No	Not considered as relevant in Norway, can be verified by labour contracts and interviews.	Verification of actual incidents will be difficult. Could be sensitive information.		N/A	
Criterion 6.4 Discrimination									
6.4.1 Evidence of comprehensive and proactive anti-discrimination policies and practices	YES		Yes		Verify policy, terms for appointments etc. Interviews of employees of different race and gender.			OK	Not many workes at the farm. Has not been an issue yet. Documentation available on site and can be verified
6.4.2 Number of incidences of discrimination	NONE		Yes	No	Verification must be based on information given from the management or employees.	Such incidents are not normally recorded, and the possibility as an auditor to confirm "none" is almost impossible.		OK	Will be reported as insident and will also be followed up if it end with an sick leave. Can be verified at the administration site or mabe on the local site.
Criterion 6.5 Work environment health and safety									
6.5.1 Percentage of workers trained in health and safety practices, procedures and policies on a yearly basis	100 %		Yes		Verification of training records, HES procedures and instructions			OK	Yearly training is not normal. Normally done every 3 to 5 years. Documentation available on site and can be verified
6.5.2 Evidence that workers use Personal Protective Equipment (PPE) effectively	YES		Yes		Can only be verified by observation of available equipment and use during the audit			OK	Equipment available on site and can be verified
6.5.3 Presence of a health and safety risk assessment and evidence of preventive actions taken	YES		Yes		Verification of HES risk analysis, action plans, safe job analysis etc.			OK	Documentation available on site and can be verified
6.5.4 Evidence that all health and safety related accidents and violations are recorded and corrective actions are taken when necessary	YES		Yes		Records of non-conformances, safety rounds etc.			OK	Documentation available on site and can be verified
6.5.5 Evidence of employer responsibility and/or proof of insurance (accident or injury) for worker costs in a job-related accident or injury when not covered under national law	YES		Yes		Verification of insurance agreements	hoved kontor 7 administrasjon		OK	Legal requirement. Documentation available at the administration site
6.5.6 Evidence that all diving operations are conducted by divers who are certified ~~for the task~~	YES		Yes		Verification of contracts and other documents related to diving operations	hovedkontor gjenomfører revisjon		OK	Done as part of supplier audit. Documentation available at the administration site
Criterion 6.6 Wages									
6.6.1 The percentage of workers whose basic wage (before overtime and bonuses) is below the minimum wage	0 (None)		Yes	No	Based on information on minimum wages for workers in fish farming industry, a verification of their salaries will confirm compliance.	In some cases only HR personnel in administration will have information of the salary for each employee, could be difficult to verify since this is sensitive information.		OK	Documentation available at the administration site

6.6.2 Evidence that the employer is working towards the payment of basic needs wage	YES			*No*		This is difficult to verify (no suggestions).		N/A	Legal regulation
6.6.3 Evidence of transparency in wage-setting	YES		*Yes*	*No*	Verification of transparency can be difficult. It depends on what level of transparency it is required. Examples could be that all positions have a defined salary range that is documented and possible to verify.	See comments in 6.6.1		OK/NC	Depending on the level in the organisation. For workes it could be possible. For leaders maybe not
Criterion 6.7 Contracts (labor) including subcontracting									
6.7.1 Percentage of workers who have contracts	100 %		*Yes*		Verification of contracts			OK	Sometime it can be available at the site. Normally available at the administration site
6.7.2 Evidence of a policy to ensure social compliance of its suppliers and contractors	YES		*Yes*		Verification of contracts and statements from suppliers			NC	This is not documented in the supplier audits
Criterion 6.8 Conflict resolution									
6.8.1 Evidence of worker access to effective, fair and confidential grievance procedures	YES		*Yes*		Verification of procedures, minutes and other documents confirming follow-up, interview of employees.			OK	Documentation available on site and can be verified
6.8.2 Percentage of grievances handled that are addressed within a 90 day timeframe	100 %			*No*		Difficult to verify 100 % compliance, must have information on all incidents.	Modified by adding a 90 day timeframe, does not make this clause easier to verify	N/A	Impossible
~~6.8.3 Percentage of grievances that are resolved~~	~~≥70%~~								
Criterion 6.9 Disciplinary practices									
6.9.1 Incidences of excessive or abusive disciplinary actions	NONE		*Yes*	*No*	Difficult to verify, can be based on information from media or court cases.	Verification of such cases is very difficult for an auditor; both sides have their own opinion; and the auditor will not be able to make a correct conclusion.		N/A	
6.9.2 Evidence of a functioning disciplinary action policy whose aim is to improve the worker	YES		*Yes*	*No*	A policy as a document can be verified, but it is difficult to verify the effectiveness of such policy.	Same as above		N/A	
Criterion 6.10 Working hours and overtime									
6.10.1 Incidences, violations or abuse of working hours and overtime laws	NONE		*Yes*		Verification of time sheets and salaries per employee and interviews.			OK	Documentation available at the administration site
6.10.2 Overtime is limited, voluntary, paid at a premium rate and restricted to exceptional circumstances	YES		*Yes*		Overtime is accepted according to Norwegian legislation; also by decree. Verification of time sheets compared with salaries.			OK	Documentation available at the administration site
Criterion 6.11 Education and training									
6.11.1 Evidence that the company encourages and sometimes supports education initiatives for all workers (e.g., courses, certificates and degrees)	YES		*Yes*		Verification of training records, interviews to verify effectiveness and satisfaction.			OK	
Criterion 6.12 Corporate policies for social responsibility									
6.12.1 Demonstration of company-level policies in line with the standards under 6.1 to 6.11 above		YES	*Yes*		A documented policy can be verified			OK	Documentation available at the administration site

PRINCIPLE 7: BE A GOOD NEIGHBOR AND CONSCIENTIOUS CITIZEN

Criterion 7.1 Community Engagement

7.1.1 Evidence of regular and meaningful consultation and engagement with community representatives and organizations	YES		*Yes*		Verification of minutes from meetings with local community, newspaper records			OK	Documentation available at the administration site
7.1.2 Presence and evidence of an effective policy and mechanism for the presentation, treatment and resolution of complaints by community stakeholders and organizations	YES		*Yes*		Verification of procedure for handling complaints from neighbors and other external interested parties.			OK	Documentation available at the administration site
7.1.3 Evidence that the farm has posted visible notice at the farm during times of therapeutic treatments110 and has, as part of consultation with communities under 7.1.1, communicated about potential negative health impacts from treatments ~~of effective complaints management and resolution~~	YES		*Yes*		Legal requirement to use a sign to inform that medication is in progress. This can be verified.			OK	Documentation available at the administration site
~~7.1.4 Evidence of third party assessment of health effects on community~~	~~YES~~						Very positive that this requirement is removed!		
~~7.1.5 Evidence of effective communication with community representatives to ensure that any displacement of communities will not have adverse impacts~~	~~YES~~						Very positive that this requirement is removed!		

Criterion 7.2 Respect for indigenous and aboriginal cultures and traditional territories

7.2.1 Evidence that indigenous groups were consulted as required by relevant local and/or national laws and regulations ~~Evidence of acknowledgement of indigenous groups' rights and titles (where applicable)~~	YES				Not relevant in Norway			N/A	Not relevant
7.2.2 Evidence that the farm has undertaken proactive consultation with indigenous communities ~~Evidence of established agreements or an ongoing process to establish agreements with relevant communities in the traditional territories~~	YES				Same as above			N/A	Not relevant
7.2.3 Evidence of a protocol agreement, or an active process to establish a protocol agreement, with indigenous communities ~~Evidence of successful consultation with aboriginal people and support from governance structures in the locality prior to site license approval~~	YES				Same as above			N/A	Not relevant

Criterion 7.3 Access to resources

7.3.1 Changes undertaken restricting access to vital community resources without community approval	NONE		*Yes*		Will be described in license documents and discharge consent (includes comments from local community)			OK	Documentation available on site and can be verified
7.3.2 Evidence of assessments of company's impact on access to resources	YES		*Yes*	*No*	Will be described in license documents and discharge consent	It is suggested that the auditor should interview representatives of the local community; this could be difficult to combine with an audit of a site. Who should define a representative person?		N/A	Difficult to verify

SECTION 8: STANDARDS FOR SMOLT PRODUCTION										No trial audit of smolt production
STANDARDS RELATED TO PRINCIPLE 1										
	8.1 Compliance with local and national regulations on water use and discharge, specifically providing permits related to water quality		YES	Yes		See comments 1.1.1				
	8.2 Compliance with labor laws and regulations		YES	Yes		See comments 1.1.2				
STANDARDS RELATED TO PRINCIPLE 2										
	8.3 Evidence of an assessment of the farm's potential impacts on biodiversity and nearby ecosystems that contains the same components as the assessment for grow-out facilities under 2.4.1		YES	Yes		Assessment can be verified.				
~~2.1: Benthic biodiversity and benthic effects~~										
	~~*Not defined*~~	~~*Not defined*~~								
~~2.2 Water quality in and near site of operation~~										
	~~2.2.1S NETPEN: For any "open" system (e.g. net pen), evidence that carrying capacity of the freshwater body has been established by a reliable entity. Analysis must take into account the natural ecological condition of the lake or water body (e.g., oligotrophic) and have been conducted within a recent (2 years) timeframe.~~	~~YES~~								
	~~2.2.2S NETPEN: Evidence that total biomass present in freshwater body (e.g., a lake) falls within the established carrying capacity.~~	~~YES~~								
	~~2.2.3S NETPEN: Instances of use of aeration systems or other technological means of increasing oxygen levels in the water body~~	~~0~~								
	~~2.2.4S FLOW: Average % change of total phosphorous between inlet and outlet~~	~~Maximum X%~~								
	~~2.2.5S FLOW: Average % change of total nitrogen between inlet and outlet~~	~~Maximum X%~~								
	~~2.2.6S FLOW: DO concentration in water discharged~~	~~At all times; DO in water discharged≥X mg/l~~								
	~~2.2.7S FLOW: Total phosphorous concentration limit in receiving waters~~	~~<X µg /L~~								
~~2.3: Nutrient release from production~~										
	~~2.3.1 FLOW: Maximum level of phosphorous in effluent~~	~~X in rivers, Y in lakes~~								
	~~2.3.2 FLOW: Maximum level of BOD (or, possibly, DO) in effluent~~	~~X in rivers, Y in lakes~~								
	~~2.3.3 FLOW: Maximum level of TSS in effluent~~	~~X in rivers, Y in lakes~~								
	~~2.3.4 FLOW: Evidence of use of sediment traps~~	~~YES~~								

	~~2.3.5 FLOW: Direct discharge of sludge and evidence of a sludge repository and sludge use~~	~~No direct discharge of sludge in public water bodies or natural ecosystems. Also, there must be evidence of a sludge repository (of appropriate size) and of sludge being used.~~								
~~2.5: Interaction with wildlife, including predators~~										
	~~2.5.1S Number of mammals and birds killed through the use of lethal action~~	~~0~~								
STANDARDS RELATED TO PRINCIPLE 3										
	8.4 If a non-native species is being produced, the species shall have been widely commercially produced in the area prior to the publication of the SAD standards. Exceptions are made for smolt production under closed systems		YES	*Yes*		See comments 3.2.1				
	8.5 Maximum number of escapes episodes (defined as 200 or more fish), with the exception of escape episodes that are clearly documented as being out of the farm's control		0, in the most recent production cycle	*Yes*		See comments 3.4.1				
	8.6 Maximum number of escapees in the most recent production cycle		300 fish	*Yes*		See comments 3.4.2				
	8.7 Accuracy of the counting technology or counting method used for calculating the number of fish		≥98%	*Yes*	*No*	See comments 3.4.3				
~~3: PROTECT THE HEALTH AND GENETIC INTEGRITY OF WILD POPULATIONS~~										
	~~*Under the SAD standard, smolt production facilities must meet standards 3.2.1 around exotic species, 3.3.1 around transgenic fish, and the escapes standards under 3.4.*~~									
	~~3.1.1S Production or holding of smolt in net pens or cages in areas where there are native salmonids~~	~~NONE~~								
	~~3.1.2S Production or holding of smolt in net pens or cages within X years of the publication of the SAD standard~~	~~NONE~~								
STANDARDS RELATED TO PRINCIPLE 4										
	8.8 Evidence of a functioning policy for proper and responsible treatment of non-biological waste from production (e.g., disposal and recycling)		YES	*Yes*	*No*	See comments 4.5.1				
	8.9 Presence of an energy use assessment verifying the energy consumption at the smolt production facility (see Appendix V subsection 1 for guidance and required components of the records & assessment)		Yes, measured in kilojoule/mt fish/production cycle	*Yes*		See comments 4.6.1				

	8.10 Records of greenhouse gas (GHG) emissions at the smolt production facility and evidence of an annual GHG assessment (See Appendix V subsection 1)		YES	Yes		See comments 4.6.2				
~~4: USE RESOURCES IN AN ENVIRONMENTALLY EFFICIENT AND RESPONSIBLE MANNER~~										
	~~*Under the SAD standards, smolt production facilities must meet standards 4.5.1 and 4.5.2, which are related to non-biological waste from production. They must also meet standards 4.6.1 and 4.6.2, which are related to monitoring energy use and GHG emissions.*~~									
STANDARDS RELATED TO PRINCIPLE 5										
	8.11 Evidence of a fish health management plan, approved by the designated veterinarian, for the identification and monitoring of fish diseases and parasites		YES	Yes		See comments 5.1.1				
	8.12 Percentage of fish that are vaccinated for selected diseases that are known to present a significant risk in the region and for which an effective vaccine exists		100 %	Yes		Records can be verified				
	8.13 Percentage of smolt groups tested for select diseases of regional concern prior to entering the grow-out phase on farm		100 %	Yes		Records can be verified				
	8.14 Detailed information, provided by the designated veterinarian, of all chemicals and therapeutants used during the smolt production cycle, the amounts used (including grams per ton of fish produced), the dates used, which group of fish were treated and against which diseases, proof of proper dosing, and all disease and pathogens detected on the site		YES	Yes		Records can be verified				
	8.15 Allowance for use of therapeutic treatments that include antibiotics or chemicals that are banned in any of the primary salmon producing or importing countries		NONE	Yes		Records can be verified. See also comments 5.2.2				
	8.16 For any use of antibiotics listed as highly important for human medicine by the World Health Organization (WHO), demonstration that a risk assessment was conducted by the veterinarian prior to prescription and application		YES	Yes		See comments 5.2.7				
	8.17 Allowance for use of antibiotics listed as critically important for human medicine by the WHO		NONE	Yes		See comments 5.2.8				
	8.18 If exotic diseases and /or parasites are detected in the hatchery, evidence of additional biosecurity measures that include restrictions on movement and evidence of strong disease management practices, including culling		Required	Yes		See comments 5.4.4				
~~5: MANAGE DISEASE AND PARASITES IN AN ENVIRONMENTALLY RESPONSIBLE MANNER~~										
	~~*Under the SAD standards, smolt production facilities much meet the health standards under 5.1, 5.2 and 5.3, as well as biosecurity standards 5.5.4 and 5.5.5.*~~									
STANDARDS RELATED TO PRINCIPLE 6										

	8.19 Evidence of company-level policies and procedures in line with the labor standards under 6.1 to 6.11		YES	Yes		A policy can be verified; se also comments 6.1 to 6.11				
~~6: DEVELOP AND OPERATE FARMS IN A SOCIALLY RESPONSIBLE MANNER~~										
	~~*Under the SAD standards, smolt production facilities must meet the same standards related to Principle 6 as grow-out facilities. See standards 6.1.1 - 6.11.1 above for reference.*~~									
STANDARDS RELATED TO PRINCIPLE 7										
	8.20 Evidence of regular consultation and engagement with community representatives and organizations		YES			See comments 7.1.1				
	8.21 Evidence of a policy for the presentation, treatment, and resolution of complaints by community stakeholders and organizations		YES			See comments 7.1.2				
	8.22 Where relevant, evidence that indigenous groups were consulted as required by relevant local and/or national laws and regulations		YES			See comments 7.2.1				
	8.23 Where relevant, evidence that the farm has undertaken proactive consultation with indigenous communities		YES			See comments 7.2.2				
~~7: BE A GOOD NEIGHBOR AND CONSCIENTIOUS CITIZEN~~										
	~~*Under the SAD standards, smolt production facilities must meet the same standards related to Principle 7 as grow-out facilities. See standards 7.1.1 – 7.4.1 above for reference.*~~									
ADDITIONAL REQUIREMENTS FOR OPEN (NET-PEN) PRODUCTION: *IN ADDITION TO THE REQUIREMENTS ABOVE, IF THE SMOLT IS PRODUCED IN AN OPEN SYSTEM, EVIDENCE SHALL BE PROVIDED THAT THE FOLLOWING ARE MET:*										
	8.24 Allowance for producing or holding smolt in net pens or cages in water bodies with native salmonids		NONE	Yes		This is relevant in Norway; verified by av overview of native species where the net pen is placed.				
	8.25 Allowance for producing or holding smolt in net pens in any water body		Permitted only for 5 years from	Yes		After 5 years no such sites can be certified.				
	8.26 Demonstration that benthic sediments under the cages have not reached hypoxic or anoxic conditions		YES	Yes		Records can be verified				
	8.27 Evidence that carrying capacity (assimilative capacity) of the freshwater body has been established by a reliable entity within the past five years, and total biomass in the water body is within the limits established by that study		YES	Yes		Will require third party assessment, report can be verified				
	8.28 Allowance for use of aeration systems or other technological means of increasing oxygen levels in the water body		NONE	Yes		Verification on site; based on equipment present and recors of use				
ADDITIONAL REQUIREMENTS FOR SEMI-CLOSED AND CLOSED PRODUCTION: *ADDITIONALLY, IF THE SMOLT IS PRODUCED IN A CLOSED OR SEMI-CLOSED SYSTEM (FLOW THROUGH OR RECIRCULATION) THAT DISCHARGES INTO FRESHWATER, EVIDENCE SHALL BE PROVIDED THAT THE FOLLOWING ARE MET:*										
	8.29 Regular monitoring of water quality parameters as outlined in Appendix VII		YES	Yes		Records can be verified				
	8.30 Maximum Total Phosphorus released into the environment per ton of production per year according to methodology in Appendix VII, subsection 2		To be determined	?	?	Not defined, but records can be verified				
	8.31 Minimum oxygen saturation in the outflow		70 %	Yes		Records can be verified				

8.32 Biosolids (sludge) Best Management Practices (BMPs) are employed (see Appendix VII, subsection 3)		YES		*No*		Unclear how this should be verified			

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REVIEW OF SECOND DRAFT OF THE SALMON AQUACULTURE DIALOGUE STANDARD (SAD) – EVALUATION OF AUDITABILITY

KARI-ANNE LENVIK AND TRUDE ORDEMANN, ESSENTIA AS, BERGEN 10.6.2011

The assessment is based on an evaluation of the revised clauses in the second draft of the standard, combined with a trial audit on a fish farming site. Due to shortage of time the trial audit did not include interview of representatives of the administration. Fresh water production was not included in this audit.

This assessment is based on the first assessment from September 2010; the detailed comments of each clause in the standard will where the clauses have not been revised include the original comments. All changes; both in the clauses and comments are highlighted in red. This document is attached to this report.

These draft standards have been revised from the first draft that was open for comment in 2010, based on public feedback and the deliberations of the Salmon Aquaculture Dialogue Steering Committee.

As mentioned in the standard; SAD establishes principles, criteria, indicators and measurable performance levels for responsible salmon aquaculture with regard to social and environmental issues. The seven areas of key potential negative impact that were identified within the Dialogue are: feed, escapes, nutrient loading and carrying capacity, benthic impacts and siting, disease and parasite transfer, chemical inputs and social impacts (i.e., labor and community impacts).

The previous main comment to the challenges of auditing against this standard was the fact that this standard is using key performance indicators, that in some cases requires results based on a period of time, and in case of any non-conformances, the closing period and verification of the corrective actions would be difficult. The revised version has improved some of the most challenging clauses; which is positive, but there are still examples that will be difficult to audit. The previous main conclusions that the audit will be very costly due to the fact that verification of results in some cases will require a long audit time, the challenge of gathering sensitive personal information such as information on internal conflicts and dependence of third parties to comply with the requirements are still the case. To read details of the comments according to these issues we refer to the previous report.

By reading the clauses and the examples of the auditing guidance; the impression is that the audit against this standard in some cases is more an investigation rather than an audit in an ISO context. Examples are the auditing guidance for Principle 1 (page 13); "*Review of any violations and associated corrective actions taken over the five-year period prior to certification to demonstrate a pattern of legal and responsible behavior. This may include review of lists developed by relevant* *regulatory authorities of companies and operations with infringements or violations or official communications by the company with government*."

Another example is from Criterion 6.9 (page 56); on Disciplinary practices where the auditor should; quote:"*investigate any allegations of corporeal punishment, mental or physical coercion, or verbal abuse*".

This type of investigations will require a different type of auditor than the type of auditor approved for ISO audits. This must be taken into consideration when the requirements defined for the auditors are done by ASC. Since some of the requirements are related to a verification of a system, a combination of a system auditor (ISO) and an "investigator" as an audit team would be the best solution.

Since the standard requires a set of target to be met; the pre-audit against this standard will include an investigation and clarification of which sites in a fish farming company that are able to comply with the requirements. A challenge could be if the standard also gives the possibility to differ between cages (pens) within a site as well. A comment given in the sub text on page 43 gives this impression; quote: "*If the antibiotic treatment is applied to only a portion of the pens on a farm site, fish from pens that did not receive treatment are still eligible for certification*".

If this should be the case; the responsibility of defining which sites that are ready for certification should be made by the company themselves as a kind of self assessment, the audit itself will then verify compliance. If a site is not complying and not able to close the non-conformances (e.g. the standard requires results throughout one generation), this site must be excluded from the list of certified sites.

It is not clarified how the verification and certification of the sites should be done; either as a 100 % verification (audit of all sites) or based on spot checks. This conclusion will have a big impact on the certification costs. It is also not clarified whether the sites to be certified needs to be close to harvesting time, or could be in the beginning of the generation. For the latter, there will be less data to verify and to conclude as compliant against the standard.

Having read the standard several times, our opinion is that the audit in fact in most cases can be done as a desk review; this was also confirmed during the trial audit. Since most of the records in salmon production today are electronic, conclusions can be made by verifying these records centrally. An effective way of organizing the audit could be to start collecting all relevant information centrally (that could in fact include all sites to be certified), and then select a representative amount of sites to be audited on site.

Relevant personnel to be audited are the Quality Manager and other personnel from administration. It is also necessary to have a dialogue with feed suppliers, veterinarian, legal authorities and local community.

Certification against this standard will give the company the possibility to label the fish as SAD certified fish; the fact that only some of the sites, and if relevant only some of the cages within a site is approved, this will require a detailed traceability system to avoid mixing of non-certified salmon with certified.

The clauses in this standard related to feed indicates that to be able to be certified, the companies needs to have close relationship with the feed suppliers, and they need as well generate the information that is needed. The understanding of the description in the standard is that the feed suppliers also needs to be verified by a third party; whether this will be within an already existing certification scheme or a new – developed by SAD, is not clear.

Result from trial audit

The site which was audited is producing salmon. The Site Manager and Quality Manager were interviewed on site. The main purpose of the trial audit was to evaluate the auditability and not to verify in detail the sites compliance against the standard.

Quality Manager was able to find most of the information in the different databases for the company; this confirms that it is not necessary to be on site to verify most of the clauses. The site Manager himself was not able to find all of this information since much of this information is centrally developed and stored.

Some of the clauses were regarded as easy to comply with based on existing routines or improvements; this particular site is also certified against the Globalgap standard, and some of the clauses were similar between these two standards. The main impression was that this standard was “easier” to comply with compared with Globalgap; our understanding is that this is due to the fact that the standard does not describe in detail the “best practice”, but only the results; and since several of these were mainly linked to information that needs to be revealed centrally; the “responsibility” of the Site Managers is less than in the Globalgap standard.

The detailed questions regarding feed was difficult to reply on and they will need a close relationship and information from the feed suppliers to be able to answer to these questions.

The site had some comments and reactions to the standard; they are summarized as followed:

1. All requirements regarding approval of the sites and sea bed surveys should be based on the standards already in place; such as NS 9410, instead of introducing new criteria that was not regarded as any improvements.
2. Several of the analysis referred to in the standard is not known and as such difficult to reply on, especially nitrogen and phosphor on sea sites and macrofaunal taxa are regarded as unnecessary. Other parameters such as Sulphide and Cu are regarded as easy to add to existing surveys.
3. The requirements regarding feed are very detailed and very academic for the workers on site. It was suggested to make the text more clear and understandable; describing the effect of the results. As per now they were not able to see the benefit and improvement effects related to these requirements.

Detailed comments to the standard

The document attached includes the detailed comments to the standard.

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: leo van Mulekom
*Organization/Company: Oxfam Novib
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3			
Principle 4			
Principle 5			
Principle 6	**Standard 6, in general**:	- I miss reference to any special women needs in labour; such as maternity rights. **Are women not working on salmon farms?**	Generize the standard by including provisions on, for instance, maternity leave
		- Quite a few salmon farms are established in somewhat remote areas. And they need to accommodate workers on or nearby the farm.	E.g. see ShAD 4.11 as an example worth looking at.

		Worker accommodation is, therefore, possibly an issue. This then also deserves a criterion and indicators.	
	For **Criterion 6.6.**	The SA8000 standard for compensation put forth by Social Accountability International states that *"the company shall ensure that wages paid for a standard working week shall meet at least legal or industry minimum standards and shall always be sufficient to meet basic needs of personnel and to provide some discretionary income."*	I would prefer the term 'fair' wages rather th 'basic' wages. But (regardless whether this i called 'fair' or 'basic') in any case this wage level should be defined at SA8000 level. Tha is 'basic needs' (water, food, shelter, clothin 'unavoidable expenses' (education, taxes, obligatory insurances and fees), and discretionary income (savings, voluntary insurance).
	Criterion 6.7	should include a provision that ensure that contracts are known/understood by both sides.	E.g. through paper (held by both parties) or independent witnesses (in verbal agreements
	Criterion 6.7.	Quite a few salmon farms make use of labour in sub-contracting form. E.g. divers and cleaners are usually employed through an intermediate person or company that provides a team of workers specific to the job (diving, cleaning, sorting, etc.) at hand. Sub-contracting is something the farm engages in. And this sub-contracting can be done responsibly or by simply going for the cheapest service available. When sub-contractors abuse workers and/or violate essential workers rights, then the farmer hiring these people is (in-avertedly) associated with that abuse. A responsible farmer should and can take measures to avoid this. Farmers can, and should, check who it is they use in sub-contracting. Is that person or company itself performing social responsibility or not. The issue is mentioned in the title of criterion 6.7 but an indicator on this is lacking.	See ShAD 4.9.4 for an example how this car be done under a farm-level standard.
	Criterion 6.8 and 6.9	Criterion 6.8 and 6.9 can be seen, together, as essential parts of a proper worker management system. A third element in such a system is communication between management and workforce (open, transparent, issues related to all workers).	Advise is to include a criterion/indicator that says something about open and (sufficiently) frequent worker-management meetings.
	Criterion 6.10.	I think SAD should minimally follow ILO on this.	Particularly add indicators that address the issue of shifts and 24 hour standby times.

			There need to be provisions limiting these to avoid/prevent and abuse of workers. E.g. stand-by time will be explicitly included as 'working time'. Also on average in a 13 wee period, the nominal work-time should not exceed 48 hours (which also means that for a short duration..it can). And workers are entit to 1 day (incl. 2 nights) off per week.
Principle 7	**Criterion 7.2**	Criterion 7.2 is not fully in compliance with international law. The UN Declaration on Rights of Indigenous Peoples (UNDRIP) is very clear on requiring free and prior informed prior CONSENT (FPIC) from indigenous people before a development, in this case a salmon farm, is undertaken on ethnic/indigenous lands. Some countries (e.g. Canada) have this within their national laws. Even then, also outside IP areas, we can and should expect a 'responsible' salmon aquaculture standard to follow the guidelines adopted by the IFC (the corporate financing arm of the World Bank) in determining that free and prior informed consultation shall have taken place (also FPIC, but the 'C' has a slightly different meaning).	The criterion should, therefore, include two specific situations: (1) in IP areas, where 'fre and prior informed consent' is required, and (2) in all other areas, where 'free and prior informed consultation' is mandatory. There are guidelines that can be provided in footnotes. E.g. http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsBy e/p_StakeholderEngagement_Full/$FILE/IFC_Stakeholderl agement.pdf http://unpan1.un.org/intradoc/groups/public/documents/cgg pan026197.pdf http://pdf.wri.org/breaking_ground_engaging_communities f http://pdf.wri.org/development_without_conflict_fpic f http://www.oxfam.org.au/resources/pages/search.php arch=free+prior&Submit=%C2%A0%C2%A0Search C2%A0%C2%A0
	Indicator 7.2.1	In addition, my reading of Indicator 7.2.1 is that it is about the company having an effective grievance mechanism.	The definition of 'effective' in the footnote could be strengthened by referring to the 7 principles outlined by John Ruggie, UN Special Rep on Business and HR. These principles are highlighted in an UN documer (http://www.business-humanrights.org/media/documents/ruggie/

			ggie-guiding-principles-21-mar-2011.pdf).
General comments			

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3			
Principle 4			
Principle 5			
Principle 6			
Principle 7			
General comments			

Comments on the final draft standard of the Salmon Aquaculture Dialogue
Submitted by the Pew Environment Group

General comments

Thank you for the opportunity to comment on the final draft standard of the Salmon Aquaculture Dialogue (SAD). As a Steering Committee member, the Pew Environment Group (PEG) has had the opportunity to convey concerns and engage in deep dialogue regarding the fine points of the individual standards. The Steering Committee members are now at the stage of assessing our individual willingness to support the final draft standard that has been developed.

PEG interest in aquaculture standards stems from concerns surrounding the environmental impacts of the global marine finfish farming industry. As laid out in the SAD literature, aquaculture is the fastest-growing food production system in the world. Salmon production has increased three-fold since 1980 to meet global seafood demand. One-third of all wild-caught fish are transformed into fishmeal and fish oil, the majority of which are consumed by farmed fish.[1] For PEG, the problem is not the existence of a few poorly performing salmon farms; the problem is that there are thousands of farms producing upwards of 500,000 fish per farm in the marine environment.

Voluntary environmental standards are one tool presently available to address the environmental and social harm from farmed seafood production. A voluntary industry performance standard cannot function if it is set in a way that puts farms out of business. Understanding this caveat, the critical question for PEG is: Does the SAD standard as currently written sufficiently drive environmental improvement?

Throughout the multi-year SAD process, we have expressed the importance of having access to farm-level impact data in order to determine where best performance lies within the salmon aquaculture industry and to determine if the resulting standards would minimize or eliminate the core impacts of concern. However, despite many years of dialogue, very little farm-level performance data has been made available to Steering Committee members or the broader Dialogue participants. Over the past two years, PEG has supported an initiative, the Global Aquaculture Performance Index (GAPI), by researchers at the University of Victoria, British Columbia to build a database of publicly available environmental performance data for marine finfish aquaculture and to quantitatively assess the environmental performance of marine finfish species and producing countries using this data. Although it is an admittedly coarse, country-level evaluation, GAPI provides the most robust database of salmon farming impact data of which we are aware. The GAPI aquaculture benchmarking study due this fall will provide greater insight into the environmental performance of all marine finfish aquaculture standards including the final SAD standard.

Based on the information we have been able to gather from government sources and initiatives such as GAPI, the SAD final draft standard appears to take steps forward in some important areas. These include:

- The minimization of escapes of farmed fish into the marine environment;
- A prohibition on the use of antibiotics considered critically important to human health;
- A requirement for certified farms to share raw, farm-level environmental impact data in a standardized, timely manner via a centralized, public database.

However, the SAD final draft standard unfortunately does not sufficiently drive environmental improvement in several key impact areas:

- The negative impacts of smolt production in freshwater lakes in Chile;

[1] http://www.worldwildlife.org/what/globalmarkets/aquaculture/WWFBinaryitem10107.pdf

- The use and discharge of antibiotics considered highly important to human health;
- The amplification of pathogens and transfer to wild fish;
- The use and discharge of toxic parasiticides.

We recognize the value of the SAD in fostering dialogue among a vast array of stakeholders. We understand the desire to reward producers that have demonstrably less impact than their competitors. We see how voluntary standards could potentially drive improved regulations in a region. But, as we are asked to assess whether or not we support any scheme that denotes environmental responsibility, we cannot ignore these serious deficiencies. Further, farm-level, voluntary standards are ill-suited to address one of the most, if not the most, critical issues facing marine aquaculture at present: can the ocean support the expansion of an industry that already farms millions of tons of fish in the sea? Given these concerns, PEG cannot support the SAD draft standard.

Detailed Comments

While this draft includes more than 100 different standards, below we highlight those areas which we believe hold some of the most pressing challenges in marine aquaculture and assess how well the SAD final draft standard addresses these concerns:

1. Farmed Fish Escapes

Given the well-documented environmental risks associated with the farming of both native and non-native salmon in net pens, we have urged that any environmental standard must: 1) require a firmer grasp on escapes numbers, including leakages and "low level" escapes; and 2) substantially reduce the number of escape episodes and total escapees. While the salmon farming industry continues to be focused on minimizing escapes (e.g. Norway's zero escapees policy), reported country-wide escapees have still numbered in the thousands to millions in recent years. Most salmon standards attempt to address escapes by setting a percent of production cap on escapees (e.g. escapees cannot exceed 1% of total fish produced). However, given vastly different farm sizes and biological context, the actual impact of this type of standard can vary substantially. Thus, we support setting a numerical threshold for both escape episodes (to weed out repeat offenders) and escapees (to reduce the overall impact of escapees).

The final draft SAD standard is, according to our review, the strongest escapes standard of any regulation or voluntary standard on record. In addition to capping total reported escapees per production cycle at 300 fish, the standard also prohibits farms with escape episodes over 200 fish (except in rare, uncontrollable events which have been defined) from being certified.

Additionally, the standard requires transparency in unexplained loss of salmon to help the farm and the public get a better grasp on the cumulative losses of fish that are currently unreported. The standard also requires producers to use smolt facilities that can demonstrate a minimum of 98% counting (+/- 2% counting error), where average industry performance seems to be 97% presently. Without an understanding of how many fish enter the system, there is no way to verify the actual number of fish that have escaped into the marine environment. While we accept 98% accuracy as the starting point for the SAD standard, we believe that 99% counting accuracy must be mandatory in the next iteration of the SAD standard.

2. Net Pen Smolt Production

We support the Steering Committee's decision to prohibit the certification of grow-out sites that source smolts from open systems in areas with native salmonids, due to evidence of interbreeding and competition of escaped farmed salmon smolts with native wild salmonids. **The five-year phase out of sourcing from net pen smolt production in all regions, however, is too lenient.** As the SAD final draft standard explains, the farming of smolts in net pens in ecologically important freshwater lakes in Chile has been associated with a broad range of negative environmental impacts. In 2007, Marine Harvest promised to remove smolt production from these regions.

Given the serious environmental consequences of open-net pen smolt production, the SAD standard should prohibit the sourcing of smolts from these systems without special allowances for any region. The fact that the vast majority of salmon smolt production takes places in closed or semi-closed systems also indicates that better performing smolt sources are widely available, albeit less so in some regions presently.

3. Use and Discharge of Antibiotics Important to Human Health
Leading public health experts including the World Health Organization (WHO) and the US Centers for Disease Control and Prevention (CDC) point to the need to severely restrict or eliminate the use of certain classes of antibiotics within animal farming including aquaculture. The drugs of greatest concern are those listed by the WHO as "critically important" to human health followed by those deemed "highly important".

According to the WHO, critically important antibiotics are defined as:

1) Antimicrobial agent used as sole therapy or one of few alternatives to treat serious human disease;
2) Antimicrobial agent used to treat diseases caused by either: (a) organisms that may be transmitted via non-human sources or (b) diseases causes by organisms that may acquire resistance genes from non-human sources. [2]

Highly important antibiotics meet either criteria 1 or 2.

In a 2009 report, WHO underscored the importance of these antibiotics. For drugs that meet criterion 1, WHO cautions that "[i]t is of prime importance that the utility of such antibacterial agents should be preserved, as loss of efficacy in these drugs due to emergence of resistance would have an important impact on human health." For those that fall within criterion 2, WHO warns that "organisms that cause disease need not be drug-resistant at the present time, but the potential for transmission shows the potential path for transmission of resistance now or in the future."[3] Similarly, in an email correspondence regarding the use of critically important drugs in aquaculture, Dr. Fred Angulo of the CDC explained: "Aquaculture use is among the most worrisome use of antibiotics in food animals (due to the open environmental application). Human medicine would be very concerned (and is very concerned) about all uses of critically important antimicrobial agents in aquaculture."[4]

The new antibiotics standard represents a step forward by prohibiting the use of "critically important" antibiotics by certified farms, however, it does not include the "highly important" antibiotics which is problematic. Currently available information on antibiotic use in salmon farming indicates that a prohibition on "critically important" antibiotics is attainable for a large portion of the industry already. Of the four antibiotics known to be used in Canadian net pen salmon farming, none are on the WHO "critically important" list. Only one of five antibiotics used by Norwegian producers and one of four used by Scottish producers fall within the "critically important "category. The little information

[2] http://www.who.int/foodborne_disease/resistance/cia/en/index.html
[3] Ibid.
[4] April 15, 2011. Email to Dr. John Forester, cc Teresa Ish, George Chamberlin and Dr. Awa Aidara Kane (WHO)

that is available on the Chilean's industry antibiotic use suggests it may be the most impacted by this standard, although alternative drugs seem to be available.[5]

The SAD antibiotics standard is unacceptable, however, as it neglects to set a cap on the use of drugs in the "highly important" category. The draft standard only requires that these antibiotics are prescribed by a veterinarian with no requirement to scale back their use over time. Concerns regarding the use of antibiotics in animal production are not limited to antibiotics defined as critically important drugs to human health. The expert report commissioned by the SAD Steering Committee to assist in developing strong standards on chemical use recommends that "classes of antibiotic compounds used for treatment of human diseases should not be used (or should be used with extreme reluctance) in aquaculture production of salmon." [6] A number of studies of antimicrobial resistance in bacteria isolated from salmon farms cite findings of resistance to highly important antibiotics as well.[7] [8] Given the risks and concerns that surround the use of antibiotics in animal production, several farmed salmon standards including "organic" salmon standards and the Whole Foods Market sourcing standard prohibit the use of all antibiotics.

To justify claims that this standard represents "best practice" and is in line with expert opinion, **the Steering Committee must maintain the current prohibition on critically important drugs while also requiring a scheduled elimination on WHO-designated "highly important" antibiotics.** The priority for an ecolabel should be to address ecological concerns ahead of certifying a larger portion of the industry.

4. Amplification & Transmission of Pathogens

One of the major weaknesses of the SAD final draft standard is the absence of measurable, performance-based standards for pathogens other than sea lice. Given the lack of data related to other pathogens (e.g. furunculosis, IPN, etc.), the SAD standard currently prescribes a variety of management practices instead of actual performance thresholds. Since disease is one of the leading ecological concerns related to net pen fish farming, the standard must set precautionary, performance thresholds to minimize pathogen impacts outside of sea lice.

The sea lice standard takes a step forward in requiring farms to participate in area-based disease management with both certified and uncertified farms. We also commend the Steering Committee for agreeing to set an on-farm sea lice threshold during sensitive periods for wild salmonids. However, we remain concerned that the Steering Committee did not come to agreement on when the on-farm sea lice threshold standard would take effect. Environmental groups on the Steering Committee support a more precautionary standard, which sets the maximum on-farm lice level to 0.1 or less mature female lice per farmed fish regardless of the sea lice levels present on wild salmonids. If the on-farm lice level exceeds 0.1 mature female lice per farmed fish during the outmigration of juvenile salmon, the certified farm would either have to remove certified fish from the water or not sell the fish as certified to the SAD standard. The other, less precautionary proposal requires farms to meet this on-farm sea lice threshold of 0.1, but only when wild fish exhibit a yet-to-be-determined average sea lice level. The lack of scientific consensus surrounding a meaningful sea lice threshold on wild fish, however, has prohibited the Steering

[5] This information is taken from an internal datasheet compiled by the SAD steering committee from a number of sources including the Scottish Executive, Norwegian Ministry of Fisheries, etc.

[6] http://www.worldwildlife.org/what/globalmarkets/aquaculture/WWFBinaryitem8842.pdf

[7] Mirand, Claudio D and Raul Zemelman. Antimicrobial multiresistance in bacteria isolated from freshwater Chilean salmon farms. Sci Total Environ. July 2002;293(1-3):207-18.

[8] C Fernández-Alarcón[1]; C D Miranda; R S Singer; Y López; R Rojas; H Bello; M Domínguez; G González-Rocha. Detection of the floR gene in a diversity of florfenicol resistant Gram-negative bacilli from freshwater salmon farms in Chile. Zoonoses Public Health. May 2010;57(3):181-8.

Committee from defining a threshold for sea lice on wild fish. **Due to the lack of consensus regarding meaningful or acceptable wild and on-farm sea lice levels, the current standard must be focused on driving on-farm sea lice levels as close to zero as possible. Given the serious risks associated with sea lice on wild juvenile salmonids, this lack of information cannot be used as a reason for the adoption of a weak standard until better science is available.**

5. Use and Discharge of Toxic Parasiticides

Net pen producers have little control over the exposure of their fish to pathogens, and thus often resort to the use of chemicals to control for these pathogens. Among industry Steering Committee members, for instance, the overwhelming opinion seems to be that parasiticides such as emamectin benzoate (SLICE) and cypermethrin are necessary to maintain low sea lice levels on farmed fish during the outmigration of wild juveniles. The final draft standard reflects this dilemma – it essentially subsidizes a relatively strong standard for sea lice transmission with an extremely weak parasiticide use standard. As an environmental performance certification, we need to ensure that both standards represent acceptable levels of environmental performance or risk.

Currently available data indicates that salmon can be farmed without the use of toxic parasiticides. Raw, self-reported farm usage data provided by the Scottish Environmental Protection Agency (SEPA) indicates that between 2006 and 2009 approximately 40 to 65% of active farms reported using no toxic parasiticides in any year.[9] Further, nearly 30% of these active farms reported using no parasiticides in every year of operation between 2006 and 2009.

At the request of the Steering Committee and with the assistance of a GIS mapping firm, PEG overlaid parasiticide usage data, wild salmon habitat information, and area-based management zones, to help us get a better feel for whether only those farms with certain geographic attributes (less or more saline, more exposed, less proximity to wild salmonid populations, not a part of an area-based management agreement) reported using zero parasiticides. On first glance, the maps suggested that there was correlation between the exposure of farm sites to the open ocean (e.g. Shetland Islands) and zero use of parasiticides. However, within the four years of data, there was also a fair distribution of farms reporting no use of parasiticides within all UK regions including those where area-based management were in effect or where farms were located closer to wild salmonid populations. In light of the detailed data that are presently available on parasiticide use in major producing regions, during the field testing phase, we urge the SAD to assess whether any existing salmon farms can achieve the established on-farm sea lice limit without the use of toxic parasiticides.

Toxic parasiticides such as emamectin benzoate (SLICE) and cypermethrin are unapproved for use in U.S. salmon production (i.e. these drugs are not on the Center for Veterinary Medicine's (CVM) approved drugs list). In 2008 inspection report of a company exporting farmed salmon to the US, the U.S. Food and Drug Administration (FDA) stated that "if the drug is not listed in the approved drugs list or if it is listed in 21 CFR 530.41, they are not allowed to use the drugs to treat salmon destined to be distributed in the US, not even if they meet withdrawal periods and no tissue residue can be detected."[10] Another inspection report stated: "Emmamectin benzoate and flumequine are not listed as approved drugs by FDA. Therefore, they pose a potential human health hazard." By allowing the use of emamectin benzoate and other toxic parasiticides, the SAD final draft standard currently permits the use of drugs not approved for use by at least one major importer of farmed salmon.

[9] Raw data provided via email by Scottish Environment Protection Agency. This data has been shared with the SAD SC coordinator as well.

[10] Documents obtained via FOIA request to the U.S. FDA.

Based on the data that is publicly available, in order for the SAD standard to at least be aligned with best practice currently, **the parasiticide standard must be improved so that it directly caps the amount of toxic parasiticides discharged by farms and establishes a phase-out of toxic parasiticides before the next iteration of the standard.**

6. Forage Fish Sustainability

The dependence of marine aquaculture on wild fish populations as a feed source remains a primary concern for PEG. Our focus is on shifting forage fish management and certification from the traditional, single-stock management approach to a more holistic, ecosystem-based approach that accounts for the dependence of populations of wild fish, seabirds and marine mammals on forage fish. Given the important role of forage fish in the marine ecosystem and the absence of systems to ensure forage fish are managed sustainably, it is also critical that farmed fish producers reduce their dependence on wild forage fish as a feed source.

With a significant caveat, we support the current SAD standard that within five years all fishmeal and fish oil in feed must originate from a fishery that is independently certified under an ISEAL-accredited scheme that has guidelines that specifically promote responsible environmental management of small pelagic fisheries. The caveat, as we have expressed to the Steering Committee, is that there can be no opportunity for the SAD, the accreditation body, or the certification body to allow for any backtracking on the five-year deadline. We believe this standard sends a strong signal to fisheries certification schemes such as MSC and to forage fish industries that traditional, single-species management and certification is unacceptable for forage fisheries.

We also appreciate the Steering Committee's willingness to alter the FishSource score standard to reflect changes to the FishSource scoring system published in May 2011. The new draft SAD standard now requires all fishmeal and oil to come from fisheries with a FishSource score ≥ 6 and a biomass score of ≥ 8. **While we have accepted this as a reasonable standard to put forward for public comment, we do not support claims of "responsible" sourcing from forage fisheries that have a FishSource score of 6 (which equates to a 60% within the Marine Stewardship Council scoring system). We are also concerned that FishSource does not seem to take ecosystem considerations into account in its scoring.** We are interested in the proposal currently being discussed among other Dialogue members to further increase the requirement to a FishSource score of 9 for the categories pertaining to precautionary management and following scientific advice.

We strongly support the Steering Committee's decision to maintain a standard that also addresses the dependence of farms on wild fish by placing a cap on a farm's fish in: fish out ratio (FFDR). As the science in support of sustainable forage fish management continues to develop, the FFDR standard provides additional assurance that certified salmon farms are placing less pressure on critically important wild fish populations.

7. Data Monitoring, Transparency and Evaluation

As consumers demand greater information about the products they purchase and the foods they consume, the credibility of any standard or certification rests on monitoring and data transparency. The labeling arena, not just within aquaculture, is feeling this push towards greater sharing of information regarding the performance of certified products. Low-fat products list their fat content and ingredients on the package. A car company claiming to be more fuel efficient than its competitors advertises its gas mileage and emissions ratings on the window of its cars. While product labels provide the first layer of assurance, like any other business, aquaculture standard setters and certification bodies should be prepared to back up claims with hard data.

One of the major challenges in assessing the impacts of marine aquaculture, and therefore the benefits of any environmental standard, is the lack of accessible, standardized farm-level impact data. The Global Aquaculture Performance Index (GAPI) report published in October 2010 demonstrates that data availability and quality continue to be preeminent challenges to assessments of performance and sustainability.[11] The upcoming GAPI aquaculture standards benchmarking study is the first attempt to quantify the value added of existing aquaculture marine standards including the final SAD standard.

PEG commends the SAD standard for being a leader in requiring data monitoring and transparency. The final draft standard requires certified farms to perform standardized and rigorous monitoring across a number of critical impacts. Unlike any other fisheries or aquaculture standard of which we are aware, the SAD Steering Committee has recommended that the certification body require certified farms to make a large portion of this raw, farm-level (including site name) environmental impact data available in a timely manner (e.g., required weekly, annually, by production cycle) through a central database and/or via the farm's own website. PEG strongly recommends that the certification bodies be required to follow the SAD Steering Committee's recommendations listed in Appendix VI. This requirement must be in place immediately, so that the performance of certified farms is continuously monitored and evaluated to ensure measurable environmental benefit. The auditor guidance document and field testing that the Steering Committee is requiring before official publication of the standard are also important components to help ensure that farms are monitored and perform as intended.

8. The Issue of Scale

In an effort to tackle the ever-looming issue of cumulative impacts, the new draft SAD standard requires all certified farms to participate in an area-based scheme with both certified and uncertified farms for managing disease and parasites and resistance to treatments. Appendix II of the new draft SAD standard details the definition and requirements of Area-Based Management (ABM). This includes an important requirement that within the defined area, at least 80% of farmed production (by weight) must participate in the ABM, even if not all farms are seeking certification under this standard. Additionally, all farms owned by the company applying for certification in the area must participate in the ABM. This level of coordination with neighboring farms is not currently required within other voluntary marine aquaculture standards, as far as we are aware. **While ABMs are a step in the right direction, they still do not fully address the issue of scale of production. By virtue of being a farm-level, voluntary certification standard, the SAD standard is ill-equipped to address the scale of farmed salmon production.**

Conclusion

In the final analysis of whether or not PEG can support the SAD standard we return to our initial question of whether the standard sufficiently drives environmental improvement. Unfortunately, the answer is no.

While we support several individual requirements of the standard, its deficiencies in addressing major environmental impacts and risks such as the transfer of pathogens and the discharge of harmful chemicals are too significant to overlook. The fact that some performers in the industry are able to achieve stronger performance within these categories furthers our concern that the SAD standard is placing greater emphasis on strong industry adoption rather than strong environmental performance. PEG cannot support the standard until it is revised to more adequately address the negative impacts of smolt production in freshwater lakes in Chile; the use and discharge of antibiotics considered highly important to human health; the amplification of pathogens and transfer to wild fish; and the use and discharge of toxic parasiticides.

[11] www.gapi.ca

To Whom it May Concern,

Please find below some comments in response to the Public Comment request on the Draft Salmon Standards:

- Pg. 7 - There are land-based (ponds/dams) type production of Rainbow Trout (Oncorhynchus) and I'm presuming this type of facility is excluded from the standards as they seem more directed at marine operations.

- Pg. 14 - For indicator 2.1.3 it is unclear as to when infauna monitoring is required to be undertaken (i.e. every year, every 5 years etc. to meet the standard) for example in South Australia on an annual basis for all sites and then once the sites have received 3 green ratings (3 years of data) then this can be undertaken once every 3 years and if a result other then green is the outcome then it reverts back to annual monitoring until 3 green results.

- Pg. 16 - For Indicators 2.2.1, 2.2.2 and 2.2.3 there are currently no requirements in South Australia for producers to conduct water quality sampling for monitoring impacts, in place of this we use infauna and video transects on an annual basis. My query in regards to these standards is that its not clear as to why this level of sampling is required (daily in some instances), what the data will then be used for and what this will be measured against. It is also unclear as to whether the monitoring would occur directly adjacent a cage, or within the AZE - it just mentions 'farm'. Instead of all farms, another suggestion could be that a producer/company owner could maybe monitor the most stocked site within a area/region the applicant owns (i.e. nursery sites vs production/grow-out sites) and this will provide information on the 'worst case scenario'.

- Pg. 17 - For Indicator 2.3.1 my concern is that this is outside of the producers control and it would be up to the manufacturing body to ensure this occurs - given that most aquaculture occurs in regional areas and requires different transport it seems that the <1% weight may be unreasonable to achieve. Would there be an introductory phase in to meeting this criteria? Also if <1% fines is not achieved then does this mean the feed cannot be used by the producer so they can maintain the certification leading to feed wastage which goes against the principles of the standard. Also is this realistic for imported feed products if no local feed manufacturer exists.

- Pg. 18 - For Indicator 2.4.1 - there are a few different ways how we address this requirement in South Australia, one at the regional level, one at a zone level and one at the site specific level. I think the regional and zone level would meet the standards requirements but in regards to identifying specifically the habitats occurring on the site at a site level - we do this through undertaking a number of video transects. I was just wondering if guidance on what is expected at the site level in regards to ensuring sensitive habitats are not located on the site could be provided - (i.e. what spatial extent of the site has to be videoed) we work on a methodology that is a mix between ideal and what is practical for industry to implement currently.

- Pg. 27 - For indicator 3.2.1 - defining of 'widely commercially produced in the area' will be a difficult term to define. In South Australia we have areas where cold water would provide for salmon aquaculture and this has been zoned as such, however although minimal production (a few cages) have been trialled none is occurring currently therefore it would be disappointing to consider that if the salmon industry did take off in South Australia that this would never be able to be certified without closed farming cages or sterile stock (it is my understanding that both of these are in the early stages of development). There is a well established salmon industry in Tasmania also therefore it would be a deterrent to investors potentially to invest in South Australia for salmon production once the ASC Certification program becomes well established which would also be unfortunate. Our sustainable management practices including escape strategies and our risk assessment process on this risk event ensures the risk of escape and impacts on the surrounding ecosystem in the event this occurs is low or negligible.

- Pg. 39 - For indicator 4.7.1 just a query more then a comment - does that mean that nets developed from non-copper treated materials can be cleaned in-situ - currently in South Australia our EPA regulates this aspect and requires no in-situ cleaning be undertaken on cages used in Aquaculture farms.

- Pg. 39 - For indicator 4.7.2 - does this indicator refer only to copper treated nets or all nets in general (just wondering because all other indicators only apply to copper treated nets.

Please note the above comments were collated by myself (discussed internally) and therefore may not be representative of the PIRSA Fisheries and Aquaculture Division views on the development of the standards.

Thanks for providing us with the opportunity to comment on the draft standards.

Kind regards,

Jade

Jade Davison
Senior Environmental Assessment Officer
Aquaculture Planning and Policy

PIRSA Fisheries and Aquaculture Division

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Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Dr. Malcolm MacGarvin
*Organization/Company: Pisces Responsible Fish Restaurants. www.pisces-rfr.org; modus vivendi ltd. Ballantruan, Ballindalloch, AB37 9AQ, United Kingdom
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
Principle 1			

Principle 2	Criterion 2.2 Water quality in and near the site of operation. 2.2.3 Nitrogen and phosphorus (See also Annex 1.3. Biodiversity-focused impact assessment	There should be a monitoring system in place, with linkage to appropriate local reference conditions, for species at risk of elevated nutrient levels. Issues and potential monitoring criteria can be adapted from other Eutrophication concerns, but aquacultural establishments are likely to be located in areas remote from other pollutants and therefore eutrophication evaluations should distinguish between 'pathological' extreme eutrophication resulting from intense urban or agricultural nutrient pollution (such as algal weed mats on intertidals) and instead evaluate for eutrophication impacts on oligotrophic systems, such as reduction in the maximum depth of eelgrass (seagrass) beds, and changes in phytoplankton community structure.	Consult on appropriate eutrophication indicators, particularly for systems and conditions relevant to the site, notably assessing for changes to oligotrophic systems. Techniques and methodologies have been developed in e.g. Denmark for evaluating nutrient impact on maximum depth of eelgrass growth and other eelgrass criteria relating to eutrophication. Entry into the literature by eg Frederiksen, M., D. Krause-Jensen, et al. (2004). "Long-term changes in area distribution of eelgrass (Zostera marina) in Danish coastal waters." Aquatic Botany 78(2): 167-181. Where aquacultural enterprises are located in sheltered sites, such as sea lochs, and where sub-fossil remains are preserved, sediment sample cores should be taken to evaluate historic phytoplankton community structure and monitor for changes in nutrient levels and phytoplankton species changes, including eutrophication indicator species (pioneering work was done in Chesapeake Bay, eg Kemp, W. M., W. R. Boynton, et al. (2005). "Eutrophication of Chesapeake Bay: historical trends and ecological interactions." Marine Ecology-Progress Series 303: 1-29 Do not assume that simple diffusion and dilution models for nutrient are appropriate.
Principle 3			

Principle 4	Criterion 4.3 Source of marine raw materials; Indicator 4.3.1; 4.3.2, Specifically Appendix IV subsection 4 explanation of FishSource scoring	A principle issue of major and frequently identified concern for carnivorous species aquaculture is the impact of the removal of large biomass of lower trophic level fish from the ecosystem upon other fish stocks and other marine life that also feed upon them. All five Components proposed for the FishSource score (Appendix 4, section 4), as indicated by the column 'Underlying ratio' are single stock specific; i.e. they relate only to the species targeted for fish meal production. Therefore the impact of the removal of these fish from the ecosystem upon other fish stocks that forage upon them, and on other components of the ecosystem is left unassessed. In short, no ecosystem management criteria are included, and if left unrevised, this will not address an issue of major and frequently identified concern, that of 'fishing down the food web'. The references to 'sustainability' in this passage (and indeed generally within the guidelines) indicate lack of awareness that multiple 'sustainable' steady states may exist. For example, a fishery that focused on maximizing sustainable yield of lower trophic level species for fishmeal and oil production might successfully establish long term viable targets for yields of lower trophic level species. But, other things being equal, the impact on fish higher up the trophic level would be more adverse (smaller stocks, due to lower food availability) than a 'sustainable' steady state focused on maximising long term yield of higher trophic level fish for marine capture fisheries, and/or 'sustainability' incorporated environmental goals of preserving a fully functioning ecosystem with all natural trophic levels represented by viable populations. Page 35 says 'In the medium term . . . The authority must also have a methodology that specifically addresses the ecological role of low trophic level species' that are in the process of development by MSC. This might be acceptable, even valuable, if you were proposing a multiple criteria, multiple score, rating system, (e.g. 1 to 5 stars, worse practice to best practice), as a means of promoting transparency and continuous improvement towards 'sustainability', giving low scores to difficult issues with the recognition that further work was to be done. But you are not: you are making an absolute unqualified statement that the certified aquacultural endeavour is 'sustainable'. As it currently stands, you are unable to assert this for the wider environmental impact of fish species utilised for fish meal and oil. As a result, I would expect that you will struggle to receive the support of individuals, groups and scientists with a specific interest and knowledge in this area as the guidelines currently stand.	Bring forward the development of the "methodology that specifically address the ecological role of low trophic level species" Do not launch certification until this has been developed to a level reaching broad consensus, and has been applied to specific certifications.

Principle 5			
Principle 6			
Principle 7			
General comments		Various aspects of the guidelines are more appropriate for a 'ratings system' approach, indicating worst to best practice, with full transparency of different aspects of strengths and weaknesses of a particular aquacultural endeavour: where it is best practice, and where work is required (including, as acknowledged, by the certifiers themselves) to assure credibility. But it is pitched instead as an absolute certification, right now, of the 'sustainability' of the certified enterprise. While there might be a certain amount of wriggle room between these two approaches, the outstanding uncertainties are of such a scale to indicate that 'all or nothing' absolute certification is inappropriate.	Think long and hard about the wisdom of your absolute approach to 'sustainability'. Is this the best format for getting the greatest support, recognising weaknesses, and driving change to a better situation?

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment

Principle 1			
Principle 2			
Principle 3			
Principle 4			
Principle 5			
Principle 6			
Principle 7			
General comments			

Dear Mrs Bostick,
dear members of the FTAD steering committee,
in regard to your work to develop global standards for responsible salmon farming, we would like to express our strong support of the positions of fair-fish and Albert Schweitzer Foundation and would therefore like to join them in their call for the inclusion of several improvements regarding fish welfare and the reduction of wild forage fish used.
Sincerely yours
Elisabeth Petras Politischer Arbeitskreis für Tierrechte in Europa (PAKT) e. V.

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Geraldine Powell MD

Individual living on Dunmaus Bay, a pristine site where salmon aquaculture has been proposed

General Comments:

This comment form is improperly constructed, a classic example of the fox guarding the henhouse. The standards are illuminating in that they reveal past nefarious practices. The problem lies not in making exacting standards, but in enforcing ethical responsibility for the environment.

These standards are not going to be enforceable. Every single item is dependent on auditing. History has shown that almost invariably, auditors become lazy, corrupt and intimidated by big money.

So you devise a form that details most of the problems attending salmon aquaculture.

How are you going to enforce these standards? My opinion is that you will wait until a sea area has been ruined and then move on to another while the government inquiry rumbles on behind you for years.

I am horrified by not really surprised that you left the question of implementation almost totally nonaddressed-just one weak paragraph, with very few specifics.

Implementation is the crucial problem. The omission of strict standards and criteria concerning auditing makes this document essentially worthless.

I have no comment on the standards except to say that the idea that only nine lethal incidents would occur over a two year period would as my father used to say ,"Make a cat laugh" In fact, the whole document makes me want to cry in despair.

R&O
SEAFOOD GASTRONOMY

January 30th 2011

Recipients:
- Global Steering Committees of Aquaculture Dialogues for Salmon, Trout and Shrimp
- Aquaculture Stewardship Council (ASC)

Letter of Concern: GMO-Feed for farmed Fish and Seafood under the new Eco-Label ASC

Dear Members of Global Steering Committees,

Dear ASC Board and Directors,

R&O Seafood Gastronomy (R&O) is France leading seafood distribution company. R&O has been strongly involved in the Aquaculture Dialogue process with the strong implication of its sustainable seafood division **OSO** in the ShAD from day one.

R&O Seafood Gastronomy is trading more than 40,000 MT of seafood per year, serving France and west Europe at a growth rate of 9% per annum, acting as French pioneer in AB/EU-organic certified seafood production and promotion. With more than 2.000 Tons of organic shrimp, seabass, salmon and seabass traded last year, R&O is a real market maker in the certified seafood business for both foodservice and traditional/fishmonger retail sectors.

We have taken notice with great concern about the actual status and current proceedings within the ongoing Aquaculture Dialogues for Shrimp, Salmon and Trout with regards to allowance for GMO, as feed ingredients for farmed fish and shrimp under the future consumer label *Aquaculture Stewardship Council ASC*.

As a leading actor of the industry with regards to fish and seafood sustainability, we do critically question the broad acceptance of an "eco-label" which is allowing GMO-ingredients for farmed animals. The use of GMO in the food and feed industry is regarded very critically by both European consumers and the general public. Consequently, the use and power of a consumer label such as the future ASC in order to promote more sustainable, environmental and socially responsible aquaculture practices will be very much limited, - in the worst case, the label will be not accepted at all. **More, this approach could be mis-leading the consumers and possibly abusing him on the actual integrity of the product he purchases in good faith**.

Another worrying fact from a marketing point of view is the complete absence of coordination between the different Aquaculture Dialogues for different species, addressing exactly the same issues of concern in aquaculture. When launching ASC-products, communication of the contents and benefits of this consumer label must be eased by consistent and clear messaging for all labelled products / species, based on consistent standards. So far with the current ASC-standards, this is clearly not the case[1] and we do wonder how to successfully launch such products on demanding consumer markets of Europe.

We do once more express the need for a credible, reliable and effective eco-labelling scheme for farmed fish and seafood, which is able to serve not only niche markets, but broader segments in the retail and food service sector. If the future ASC, - as it is being developed under the above outlined circumstances -, is going to be able to serve these essential needs, is currently uncertain and remains to be seen.

We do strongly recommend to reconsider the issue of GMO in feed and we do emphasize once more the need for more consistent ASC-standards for all species and products subject to labelling before first certified products are being launched in 2011.

In full appreciation of your attention and understanding,
Sincerely,

Mathias ISMAIL
Group Managing Director

[1] Important crosscutting issues for different species which need more consistency from a marketing point of view do encompass standards for feed (including GMO!), pollution of water, conservation of habitats, exotic species, use of therapeutics / chemicals and social responsibility.

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Misty MacDuffee
*Organization/Company: Raincoast Conservation Foundation
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 3	3.1, 3.2, .3.4	Despite the numerous principles, criteria, and related standards drafted within the Salmon Aquaculture Dialogue (SAD), we are concerned that the primary negative ecological impacts associated with salmon farming - namely, the transfer of pathogens from farmed to wild fish, the farming of non-native species, and transfer of sea lice from farmed to wild fish - will not be eliminated or minimized to a near-zero level as is necessary for salmon aquaculture to be considered sustainable. This is because the use of open net-pens to raise salmon remains a fundamental cause of impacts to wild salmon, and the standards do not address the fact that open net-pens cannot contain pathogens or even the fish themselves. Until this issue is addressed, Raincoast cannot endorse certification as proposed by SAD. Our primary area of concern is with Principle 3, specifically: 3.1, 3.2, and 3.4, as these are areas where Raincoast Conservation Foundation has focused its research and conservation efforts. We believe these problems cannot be contained when high-density aquaculture shares the same fluid environment as wild salmon stocks. Below, we identify critical issues that persist un-addressed with the ongoing use of open net pens.	The pathogen and escape problem of open net cages cannot be solved because they are nets in a fluid environment. They need to be moved to closed containment.

PRINCIPLE 3:
PROTECT THE HEALTH AND GENETIC INTEGRITY OF THE WILD POPULATION

"The primary aim of Principle 3, in combination with Principle 5, is to ensure salmon farms do not harm the health of wild fish populations. This principle addresses impacts associated with disease and parasites, escapes and siting".

Despite the numerous principles, criteria, and related standards drafted within the Salmon Aquaculture Dialogue (SAD), we are concerned that the primary negative ecological impacts associated with salmon farming - namely, the transfer of pathogens from farmed to wild fish, the farming of non-native species, and transfer of sea lice from farmed to wild fish - will not be eliminated or minimized to a near-zero level as is necessary for salmon aquaculture to be considered sustainable. This is because the use of open net-pens to raise salmon remains a fundamental cause of impacts to wild salmon, and the standards do not address the fact that open net-pens cannot contain pathogens or even the fish themselves. Until this issue is addressed, Raincoast Conservation Foundation cannot endorse certification as proposed by SAD. Our primary area of concern is with Principle 3, specifically: 3.1, 3.2, and 3.4, as these are areas where Raincoast Conservation Foundation has focused its research and conservation efforts. We believe these problems cannot be contained when high-density aquaculture shares the same fluid environment as wild salmon stocks. Below, we identify critical issues that persist un-addressed with the ongoing use of open net pens.

1. Transfer of disease to wild fish

There are four major infectious diseases that affect salmon in industrial farming operations [2,3,4]. These diseases pose the risk of being spread to wild salmon stocks:

- Infectious Salmon Anaemia (ISA)
- Infectious Hematopoietic Necrosis (IHN)
- Furunculosis
- Bacterial Kidney Disease (BKD)

Infectious Salmon Anaemia (ISA) is a highly infectious disease primarily of Atlantic salmon (Salmo salar) that was first reported within Norwegian aquaculture facilities. Its mode of transfer and the natural reservoirs of ISA virus are not fully understood. Since first detected in 1984 it has spread to Canada's east coast and has recently been found in the Chilean salmon farming region in the Pacific.

Infectious Hematopoietic Necrosis (IHN) is a virus that affects both wild and farmed salmon. Sockeye, chinook, coho, rainbow trout and Atlantic salmon can all contract the virus, but Atlantic salmon are particularly susceptible. IHN is a virus and not a bacterial infection and infected fish are not treated with antibiotics[2.]

Furunculosis is another highly infectious disease. It is caused by the bacterium Aeromonas salmonicida, Both Atlantic and Pacific salmon are susceptible to this disease at all stages of their lifecycle. In 2005 furunculosis killed 1.8 million Atlantic salmon smolts at a single commercial salmon hatchery on Vancouver Island. The disease occurs in salmon farms throughout Scotland, Norway, Canada, the Broughton Archipelago in British Columbia, and Washington State.

Bacterial Kidney Disease (BKD) is a chronic systemic bacterial condition of salmonids caused by *Renibacterium salmoninarum*. Infection can result in significant mortalities to both wild and farmed salmonids. The first outbreak of BKD in farmed salmonids occured in Scotland in 1976. Since then it has been found in salmon farming operations around the world. Vaccines and antibiotics are used in salmon aquaculture to control infections. Vaccines are given by inoculation but antibiotic treatments are typically done through medicated baths and medicated feed. The latter two methods of delivery increase the chance that antibiotics will pass into the environment, affecting other salmonids, other organisms, and remaining for long periods of time[1].

ISA and IHN are listed as reportable diseases by the World Organization for Animal Health[6]. This means that immediate notification to the world body is required within 24 hours if an outbreak of these disease occurs in a country or zone or compartment of the country that was previously considered to be free of that particular disease.

2. The farming of non-native species (exotics)

Over 90% of the salmon raised in BC's salmon farms are Atlantic salmon, a non native species. The other 9% consists of Chinook and coho. The escape of farmed Pacific and Atlantic salmon into wild salmon habitat poses a serious threat to indigenous stocks of wild Pacific salmon. Escapes have the potential to out-compete wild salmon for habitat and food and spread disease and pathogens to wild fish.

As WWF's own Salmon Aquaculture Dialogue Report on escaped salmon has found, farmed salmon "are usually recorded within 500 km of the escape site, but have been recorded up to 2,000 – 4,500 km from the escape/release site." [7]

The Atlantic Salmon Watch Program (ASWP), a cooperative research program operated by the Department of Fisheries and Oceans (DFO) and BC's Ministry of Agriculture and Lands (BCMAL), conducted monitoring and removal of escaped Atlantic salmon from streams. While operational, this program suggested that there have been cases of escaped farmed Atlantic salmon surviving and then breeding with other escaped Atlantic salmon in BC streams.

The presence of adult Atlantic salmon have been documented in 36 streams within DFO's Salmon Escapement Data base (SEDs). Locations include BC's Broughton Archipelago, north eastern Vancouver Island, the south coast mainland and the west side of Vancouver Island (DFO, SEDS 2009).

A study published in *Conservation Biology* reported that non-native Atlantic salmon were found in over 80 wild salmon spawning streams in British Columbia, with feral juvenile Atlantic salmon having been discovered at three locations.[8] However, very little research has been done with regards to the extent of Atlantic salmon populations in BC rivers today.

Escape numbers in BC are likely much higher than reported

According to the Ministry of Agriculture and Lands (BCMAL), the agency responsible for tracking industry-reported farmed salmon escapes, over 1.5 million[9] farmed salmon escaped into BC waters between 1987 and 2008. Escapes were due to system failure related to extreme weather, net tears or structural damage resulting from propeller or boat collision with the nets, attacks by predators such as seals and sea lions or through human error and vandalism.

However, these figures likely represent the minimum. The magnitude of unreported escapes is unknown due to failure to report all escapes and those due to “leakage”.

Leakage

Salmon farmers typically only report large-scale escape events.[10] Unreported escapes that occur during what industry calls “leakage” is the ongoing small-scale escape of farmed salmon during ordinary operations. Research done in BC estimates that 0.5 to 1 percent of juvenile Atlantic salmon in production “leak” from their pens each year.[11] Assuming that 1% of the approximately 80,000 tonnes of farmed salmon currently produced each year in BC is leaked, this translates into approximately 160,000 additional farmed salmon escaping into BC’s marine environment annually.

By omitting leakage from the equation, government greatly underestimates and downplays the full magnitude of escapes. For instance, BCMAL reports that in 2005 only 64 salmon escaped from BC salmon farms while 70,400 tonnes of salmon were produced for market; and that in 2006 the industry reported 19,000 fish escapes during the production of 78,000 tonnes of farmed salmon.

Rising numbers of Escapes

Despite new guidelines (DFO 1999) for net strength and pen system anchoring in Canada, BCMAL reported more than 100,000 escaped farmed salmon in 2008, more than the previous six years combined. In 2009, escape events reported at least 48,000 more Atlantic salmon escaping into the marine environment.

Meanwhile, very little in the way of penalties or fines are levied against the offending companies. For instance, the most recent *Annual Inspection Report on Marine Finfish Aquaculture Sites (*2008) issued by BCMAL shows only one violation for “failure to report a possible escape” with a fine of $173.[12]

With escapes on the rise in recent years, incomplete data on the full extent of escapes and minimal repercussions for escape events, it’s clear that BC’s salmon farming regulations are not adequate. These lax regulations are an example of how the government continues to enable salmon farming companies to externalize the costs of a dirty, unsustainable industry onto the environment and people of British Columbia.

3. Sea lice and the transfer to wild salmon

The issue of sea lice transfer from salmon farms to wild salmon is a controversial topic in every country where salmon are farmed (Canada, Norway, Ireland, Scotland, Chile) because of the risk that enhanced lice densities can have on wild salmon populations. There are 2 common genuses of sea lice that infect salmon in BC marine waters, *Lepeophtheirus* and *Caligus.*

Sea lice from salmon farms are one of the most significant threats facing wild salmon in British Columbia. Stocked year round with hundreds of thousands of fish in small areas (net-cages) fish farms are ideal, and unnatural breeding grounds for lice. Infestations on farms significantly increase the number of lice in surrounding waters, far beyond what would occur naturally.

Sea lice feed on the mucous, blood and skin of salmon. While a few lice on a large salmon may not cause serious damage, large numbers of lice on that same fish, or just a couple of lice on a

juvenile salmon, can be harmful or fatal. The feeding activity of sea lice can cause serious fin damage, skin erosion, constant bleeding, and deep open wounds creating a pathway for other pathogens.
When wild juvenile salmon emerge from the rivers in the spring, hundreds of thousands of salmon smolts are exposed to sea lice when they pass through salmon farming regions of coastal BC. When lice attach themselves to juvenile pink, chum, and sockeye smolts their bodies are often not able to cope with the intrusion, and they can die. Peer-reviewed research has shown that one to three sea lice are enough to kill a juvenile pink salmon newly arrived in saltwater.[13]

Sea lice are also a possible vector for disease transfer between farmed and wild salmon. This has already been shown for Infectious Salmon Anemia (ISA) on the Atlantic coast.[14,15] An outbreak of ISA on salmon farms in Chile in 2007 spread rapidly from one farm to the next, leading to whole pens and in one case an entire farm's worth of fish having to be destroyed. Sea lice have been identified as a possible factor in the rapid spread of the disease. The furunculosis bacterium has also been found on sea lice, making it likely that sea lice spread this disease as well.[16]

Published Science on Sea Lice

Research published in *Science* in December, 2007 was the first study to calculate the impact that individual wild salmon mortalities from sea lice infestation can have on the whole population[17]. The *Science* study found that recurrent louse infestations of wild juvenile pink salmon were all associated with salmon farms and they have depressed wild pink salmon populations, placing them on a trajectory toward local extinction. The louse-induced mortality of pink salmon was commonly over 80%.

Raincoast's submitted and published sea lice studies include:

Price, M.H.H., Morton, A., Eriksson, J.G., and Volpe, J.P. *In review*. Fish processing facilities: new challenge to marine biosecurity. Journal of Fish Diseases.

Price, M.H.H., Proboszcz, S.L., Routledge, R.D., Gottesfeld, A.S., Orr, C., and Reynolds, J.D. 2011. Sea louse infection of juvenile sockeye salmon in relation to marine salmon farms on Canada's west coast. PLoS ONE 6: e16851.

Price, M.H.H., Morton, A., and Reynolds, J.D. 2010. Evidence of farm-induced parasite infestations on wild juvenile salmon in multiple regions of British Columbia, Canada. Canadian Journal of Fisheries and Aquatic Sciences 67: 1925-1932.

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Canada. Department of Fisheries and Oceans, Pacific Biological Station, Nanaimo, BC, Canada. In American Fisheries Society's Fish Health Newsletter, Volume 26, 1998.

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[10] http://www.gov.bc.ca/

[11] http://www.llbc.leg.bc.ca/public/pubdocs/bcdocs/300626/v1chp5.htm

[12] Alverson and Ruggerone 1997

[13] BCMAL Annual Inspection Report on Marine Finfish Aquaculture Sites (2008)

[14] Morton, A. and R. D. Routledge (2005). Mortality rates for Juvenile Pink Oncorhynchus gorbushca and Chum O. keta salmon infested with Sea Lice Lepeophtheirus salmonis in the Broughton Archipelago. *The Alaska Fisheries Research Bulletin*. 11(2): 146-152

[15] Dannevig, B.H. and K.E. Thorud, Other viral diseases and agents of coldwater fish: infectious salmon anemia, pancreas disease and viral erythrocytinecrosis, in *Fish Diseases and Disorders, Volume 3, Viral, Bacterial and Infections*, P.T.K. Woo and D.W. Bruno, Eds. 1999, CAB International: Wallingford and New York p. 149-175.

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Dear WWF

I am responding as a person who is not paid and thus able to take the time to fill in all the spots that you want filled in, but in a nutshell, you should only bring out regulations that put fish farms **on land in closed containers**.

I have written on the problems with fish farming for almost ten years, and it is my opinion that any reasonable person who Googles fish farm science will find the science is ten feet deep saying fish farms should be in closed containers, preferably on land.

Fish farms have no need of saltwater as they can be raised in freshwater. Moving them to lakes would do away with problems of destroying wild salmon, leave employment, elminate destruction of places like Chile, not infect the Pacific with Norwegian viruses. But that will not do anything about the sewage problems, destruction of forage fish for feed and the ethical issue of taking food out of the mouths of third world people and nations like the US bringing in countervailing duties against such products because they can, for perceived environmental degradation and effects on wild salmon, viewing that as a subsidy by the government involved that does not require cleaning up of the ocean floor and repopulating the ocean bed with the species that were destroyed. If those externalities were considered and paid for, fish farms would not be productive in a water body of salt or freshwater.

I have found 11 different closed systems, most of which are on land, all across North America. One of these is a research facility that provides science for 200 on land farms. In other words there are more fish farms on land in North America right now than there are in all of BC's saltwater. Why are they there? If you come up with any other regulations than closed containers on land, then you should not publish them.

Consumers will not buy farmed fish, restaurants will not serve them. Farms need to be on land to save their own businesses, and the jobs of their employees.

DC Reid

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Aldin Hilbrands & Karin Bogaers
*Organization/Company: Royal Ahold
*E-mail address: ______________________ ______________________

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
All	All	As a general comment we believe that the ASC standard should allow for continuous improvement and recognize the logistics and cost implications for a company wanting to serve its customers with ASC certified salmon. We believe it is unrealistic that a sufficient number of farms (needed to gain traction in the market for ASC certified fish) will be able to become certified if all standards have to be met 100%. Unless a farm can meet all criteria at the outset there is no flexibility or encouragement for prospective operators to achieve the standard. Had there been less of a prescriptive approach, by relaxing certain criteria, greater interest may have been shown to strive to meet the Standards. Better to have started with a lower baseline working towards targets set on continuous improvement.	Require 100% compliance within the lifetime of the 5-year certificate just like MSC does. In the meantime, corrective action plans must be put in place which are verified by the auditor to ensure continuous improvement is demonstrably happening. Certification is granted when performance score of 80% is achieved. In any case, this will be one of the main issues for the ASC to discuss and decide about across all dialogues.
All	All	A separate assessment guidelines is needed on how auditors are supposed to assess - and farmers to implement - the standard. This has been produced now for tilapia after the dialogue ended. However for the other dialogues it is of high importance to start working on this as the standard is finalised. Peer review and field-testing by auditors is highly recommended.	Write an auditor assessment document and field-test it before use as a formal certification document by the ASC. Furthermore, a farmer implementation document would

			also be an important tool helpful for interested producers.
Principle 1	General	To demonstrate compliance with all relevant laws is obvious but how to verify this is a completely different story. It also needs specific expertise from an auditor in particular if you talk about tax laws since you would almost need an accountant in the team which already needs to consist of environmental and social specialised auditors.	Include in auditor assessment documents which objective evidence is to be demonstrated to auditor. Most realistic option is to have a farmer document its farming activities and how these are covered by the relevant legislation. Farmer to confirm legal compliance in conjunction with governmental registrations/approvals/inspection reports. This puts the burden of proof with the farmer and not with the auditor. In addition many auditing companies would not want this responsibility/liability on their plate for the right reasons.
	2.1.1 – 2.1.3	Some of the suggested indicators require methodology that is not commonly used today and likely to have a high cost There may also regional differences and natural variation that should be taken into account. This applies for instance to DO levels in parts of BC which, at specific period of the year, will be low due to natural up-welling from deeper water. This happens irrespective of salmon farming DO wouldn't be used to measure phytoplankton effects and should be dropped	The standard should require monitoring of benthic diversity and benthic effects for a period of two production cycles in order to establish baseline values for the suggested indicators. Following the monitoring period, concrete standards should be set with reference to registered baseline values. Regional differences should be accepted and a tiered approach would be preferable. Requirement to complete taxonomic samples only if chemical threshold exceeded. Therefore, 2.2.1 should be removed as it doesn't add value.

	2.5.1/2.5.2/2.5.3/2.5.6	As written the standard accepts that lethal action against marine mammals (read seals) may be used as a last resort as long as the animal in question is not endangered/red-listed. At the same time the standard requires that ADDs are abolished within two years of the date of publication of the SAD standard. The main argument for the abolishment of ADDs is that the high pitched sounds from these devices may cause pain to dolphins, porpoises and whales and possibly interfere with the communication between some of these animals. As a result marine mammals may be scared away from natural feeding and breeding grounds. If ADDs are to be abolished it is logical to allow for killing a higher number of seals than suggested in the standard draft. ADDs are a requirement on many sites as part of planning permission and to achieve the target of zero shooting. It is disappointing that all ADDs are categorised as being harmful to cetaceans when this may not always be the case. For example, work at the Sea Mammal Research Unit (St Andrew's University) is focussing on a new startle response seal scaring system. We believe the use of ADDs should be reviewed.	The standard should allow for killing of 5 marine mammals over the prior two years (2.5.6)
Principle 3	3.1.2	Demonstrated commitment by company, not necessarily at farm level (for each farm). There is a missed opportunity here for Scotland. As it stands it is likely the majority of the Scottish industry will be excluded from the Standards because of freshwater loch smolt rearing. The collaborative research work that could be undertaken in Scotland is therefore unlikely as outlined in this Criterion.	Not required for each individual farm, but required at the company level.
	3.1.5	We understand the intention of the standards under criterion 3.1 to be to reduce sea lice infection pressure on wild salmon as they migrate out to sea	Footnote 29 should refer only to wild salmonid migration route (remove habitat)
	3.4.3	On average it is not possible to reach this level of accuracy today, but new counting equipment will hopefully make it possible in the future	The standard should allow for a three-year transition period to move from 95 > 98%
Principle 4	4.1.1	The criterion cannot be audited at farm level so does this mean another audit at the feed mill?	Requires auditors clarification so needs to be removed or included in the auditors assessment document.

	4.2.1 / 4.2.2	FFDR becomes redundant when marine ingredients come from certified fisheries sources. Unilateral action by aquaculture to reduce forage fish use won't promote human consumption, given the demand for fishmeal and oil from other, less efficient users of the resource (e.g., pig and poultry production).	Exclude all fish meal and oil from the calculation when it comes from certified sources.
	4.3.1	ISEAL accreditation does not exist, only ISEAL membership does exist. ISO Guide 65 accreditation does exist.	Please re-word requirement in line with existing arrangements and not formulate something that is non-existent and thus cannot be assessed by and auditor.
	4.3.2	FishScore is an NGO tool so the scoring methodology can be changed unilaterially anytime having big impact on certified producers. Apart from this, not all fisheries are covered (or can be covered due to resource constraints) so what happens in this case? Does the farm need to pay for this? And if yes to whom?	Refer to IFFO or equivalent other schemes and just as with 4.3.1 a shortlist needs to be drawn up acceptable to most stakeholders. By the way in the text on page 31 (third para), reference is made to FishScore or equivalent schemes but no further details are given of this equivalence.
	4.3.3	What is the difference with 4.1.1?	Clarify difference.
	4.3.3	ISO 65 does not exist.	Reword into "ISO Guide 65" and include clarification as to what is meant with this.
	4.4.1	It is unclear what is meant with "... recognised crop moratoriums..." but recognised by whom?	Clarification needed since otherwise it is impossible to audit.
	4.5.1	It is unclear what is meant with "...a functioning policy..."	Suggest to reword as "effective policy" but then it has to be specified how to auditor is supposed to verify effectiveness in the auditor assessment document.
	4.7.4	Local variation in background levels of Cu should be accounted for	The standard should distinguish between local background levels and direct farm discharge of Cu
Principle 5	5.1.7	A mortalities reduction program should only be required for farms that exceed a specific mortality.	Standard should require a mortalities reduction program

			only for sites that have mortality rates higher than 10% over the previous three production cycles
	5.2.8/8.17	We believe the main intention of the WHO in their attempt to reduce antibiotics listed as critically important for human health in veterinary medicine has been to reduce the occurrence of zoonosis (a known problem for instance with chicken in Asia). As far as we know there are no infectious diseases that can be transferred from salmon to humans. In order to maintain good fish health, salmon farmers should therefore, as a last resort for treating bacterial diseases, be allowed to use antibiotics that are on the WHO list. The salmon aquaculture industry is a relatively small industry dependent on few available drugs. If rotation of drugs is not possible and suboptimal choices regarding sensitivity need to be taken due to such a ban, this may compromise a responsible drug management policy to avoid drug resistance developing. We also regard it to be wrong in this case to prevent whole drug classes.	Remove standard. Include risk assessment for critically important antibiotics in standard 5.2.7/8.16 (along with highly important antibiotics)
	5.3.2	In regions with only one type of treatment allowed for use (e.g. only slice allowed in BC) this standard is not possible to meet	
	5.4.3	Fitting well-boats with new equipment is a costly an time consuming process. The standard should therefore allow for a reasonable transition period	The standard should give a transition period of three years after the standard has been published for having the described equipment in place
Principle 6	6.5.1	Further description is required of what evidence a farm should be able to provide.	Include in the auditor assessment document which is to be produced for the entire standard.
	6.6.2	This is a much better formulation compared to the Shrimp standard - to allow employers to improve towards paying a basic needs wage, rather than expecting it now. However, it is still not entirely clear how the Dialogue defines basic needs wage (particularly the "etc.").	Definition and calculation of basic needs wage to be included in the auditor assessment document which is to be produced for the entire standard
	6.6 Auditing Guidance point 2	If you leave the calculation of basic needs wage to the employers and their stakeholders, there is a risk that the basic needs wage differs from farm to farm depending on the strength of the stakeholders.	Some additional guidance on which stakeholders to consult and which elements to consider would be encouraged to be included in the auditor

			assessment document which is to be produced for the entire standard.
Principle 7	All Principle 7	All indicators under principle 7 are quite advanced, and I wonder if they can realistically be expected from salmon farmers. We will need field tests to determine this under the guidance from the ASC after the SAD has finished.	In any case, clear and comprehensive guidance for farmers is required.
	All Principle 7	There is improvement in how social criteria are defined and described, but more guidance is needed on how auditors are supposed to assess - and farmers to implement - the standard.	Write an auditor assessment document and field-test it before use as a formal certification document by the ASC. Furthermore, a farmer implementation document would also be helpful for interested producers.
	All Principle 7	All available AD Standards (Tilapia, Pangasius, Bivalves, Trout, etc.) have different social criteria and interpretations. That will have implications for implementation, auditability and building audit capacities - i.e. it will be difficult to group auditor training if each standard has a specific set of requirements.	Review and agree universal social criteria to ensure a consistent approach across the dialogues. This will be the only way to substantiate an ASC claim and consumer logo.
	7.1.3	Environmental and human health risks have not been established with respect to therapeutants and salmon farms. Complete risk assessment prior to jumping to the conclusion that antibiotic warning signs are required.	Replace with general signage stating public safety exclusion zone.

Formulario de Comentarios para Borrador de Estándares Diálogo sobre Salmonicultura

Segundo periodo de Comentarios Públicos: 31 de mayo a 30 de junio 2011

El Formulario de Comentarios completado debe ser enviado a la dirección de correo electrónico: salmonaquaculture@wwfus.org hasta las 11:59 p.m. EDT del 30 de junio de 2011.

*Nombre: Carlos Odebret Beyer
*Organización/Empresa: SalmonChile INTESAL
*Dirección de correo electrónico: ____________________

Nota: Es absolutamente obligatorio que complete toda la información solicitada y marcada con asterisco (*), ya que todos los comentarios serán publicados en el sitio web del Diálogo sobre Salmonicultura, citando la fuente de ellos (nombre de quien comenta e institución a la cual pertenece), lo cual se encuentra alineado con la política de transparencia del Diálogo. La dirección de correo electrónico no será publicada, pero es necesario contar con ella para clarificar la información en caso de ser necesario.

COMENTARIOS SOBRE LOS ESTÁNDARES PARA ENGORDA DE SALMONES

Principio	**Criterio/Indicador /Estándar** (ej. 2.1.2)	**Comentario(s)**	**Solución propuesta o corrección**
Principio 1	1.1.5.	Esto no es posible de evidenciar en el centro, especialmente para aquellos centros con primer ciclo de producción.	
Principio 2	2.1.2.	Este valor es difícil de alcanzar, ya que existen áreas con condiciones naturales que no lo presentan. Por lo tanto, nos es factible de cumplir, incluso antes que el centro comience sus operaciones.	
	2.5.1.	El uso de estos elementos constituyen una alternativa y en el futuro pueden existir innovaciones que pueden ser muy efectivas sin afectar al sistema.	

	2.5.4.	No es factible de cumplir. Obtener una autorización por parte de la Autoridad Pesquera podría demorar algunos días, con el riesgo de un eventual escapes ante una situación de emergencia.	
Principio 3	3.1.1.	No es factible de cumplir. Traspasa el alcance del centro en un área de manejo en su conjunto. No es posible que el centro sea responsable del cumplimiento de los otros centros integrantes del área Este punto puede complicar la implementación del estándar en los centros en Chile.	
	3.1.2.	No es factible de cumplir por un centro, ya que escapa a las atribuciones de un jefe de centro. Corresponde a políticas de empresa.	
	3.4.2.	No es factible de cumplir. Dada las operaciones de los centros no es posible evidenciar estos números y atribuirlos solo a escapes. Puede haber otros motivos que puedan generar diferencia en el número de peces del centro, los cuales no están considerados en el estándar. Por Ejemplo, leves errores en la cuantificación diaria de mortalidad.	

	3.4.3.	No es factible de cumplir. La experiencia en terreno indica que error de estos instrumentos es de 95%.	
Principio 4	4.1.1.	Existe presencia y pruebas de trazabilidad de todos los ingredientes. En algunos proveedores no se está disponible como una "cadena de custodia certificada". Para lograr esto se debería indicar un plazo de 5 años.	
	4.2.2.	Es difícil de cumplir. Se puede cumplir pero significa afectar los parámetros esperados en el alimento.	
	4.3.1.	Se propone que el estándar sea IFFO SR, si no es así es poco factible cumplirlo.	
	4.3.4.	Se propone que el estándar sea IFFO SR, si no es así es poco factible cumplirlo.	
	4.6.2. y 4.6.3.	Se proponen 5 años para poder establecer la documentación.	
	4.7.5.	No es factible de cumplir. Los centros deben someterse a la legislación de su país.	
Principio 5	5.2.5.	No es factible de cumplir. El espíritu del criterio no plica a los tratamientos por baños dado que la	

		dosis es fija independiente del tamaño de los peces. Él promedio de tratamientos es cada 1,5 meses. En un ciclo de 15 meses se realizarían 10 tratamientos superándose con creces el estándar.	
	5.2.7.	No es factible de cumplir. No está definida la metodología del análisis de riesgo.	
	5.2.8.	No es factible de cumplir. Este criterio solo nos dejaría como alternativa el uso de Florfenicol.	
	5.3.1.	No es factible de cumplir. No existe metodología estandarizada para el caso de los antiparasitarios.	
	5.3.2.	No es factible de cumplir. No existe metodología estandarizada para el caso de los antiparasitarios.	
Principio 7	7.1.1. al 7.3.2.	No es factible de cumplir por el centro. No está dentro del alcance del centro.	
Comentarios Generales	**El estándar considera certificaciones y cumplimientos que traspasan la gestión de un centro, incluso de la empresa, por lo tanto no son factibles de cumplir y difícil de evidenciar.**		

COMENTARIOS SOBRE LOS ESTÁNDARES PARA PRODUCCIÓN DE SMOLTS (Sección 8 del documento)

Indicador/Estándar (ej., 8.4, or 8.22)	**Comentario(s)**	**Solución propuesta o corrección**
8.6.	No es factible de cumplir. Dada las operaciones de los centros no es posible evidenciar estos números y atribuirlos solo a escapes. Puede haber otros motivos que puedan generar diferencia en el número de peces del centro, los cuales no están considerados en el estándar. Por Ejemplo, errores en la cuantificación diaria de mortalidad.	
8.7.	No es factible de cumplir. La experiencia en terreno indica que error de estos instrumentos es de 95%.	
8.16.	No es factible de cumplir. No está definida la metodología del análisis de riesgo.	
8.17.	No es factible de cumplir. Este criterio solo nos dejaría como alternativa el uso de Florfenicol.	
8.27.	No es posible cumplir. La capacidad de carga debe evaluarse por	

	cuerpo de agua, lo que está fuera del alcance del centro y de la compañía. Por otro lado, debe corregirse el concepto de Declaración de Impacto Ambiental (DIA). Las DIAs son por centro y no por cuerpo de agua.	

Please find enclosed S&TA response to the SAD standards. We would also like to add that we were very disappointed to only receive 30 days for public comment- this was not sufficient to allow appropriate feedback.

Kind regards,

Janina Gray

Head of Science
Salmon & Trout Association
Fishmongers' Hall
London Bridge
London
EC4R 9EL

www.salmon-trout.org

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10/06/2011

To SAD Steering Committee,

The Salmon & Trout Association (S&TA) welcomes the opportunity to comment on the draft Salmon Aquaculture Dialogue standards

The S&TA was established in 1903 to address the damage done to our rivers by the polluting effects of the Industrial Revolution. For 107 years, the S&TA has worked to protect fisheries, fish stocks and the wider aquatic environment on behalf of game angling and fisheries. In 2008 it was granted charitable status. S&TA's charitable objectives empower it to address all issues affecting fish and the aquatic environment, supported by strong scientific evidence from its scientific network. Its charitable status also enables it to take the widest possible remit in protecting salmonid fish stocks, and the aquatic environment upon which they depend.

General comments
We remain very disappointed that the current standards do not champion closed containment, which we feel is the only effective way to mitigate the majority of the risks posed by salmon farming to wild salmonids. In order to move towards sustainable salmon farming, the standards must encourage the industry to invest in closed containment. We feel the standards must make greater reference to continuous improvement in this direction.

We support the draft standards' proposal that smolts raised in open net pens in wild salmonid systems are ineligible for certification, due to risk of genetic dilution, the spread of diseases and parasites, and the risk of pollution of the surrounding environment.

Comments on Principle 3
There is still also no indication on how the information applicants are required to collect and monitor as part of the certification will be audited, and then fed back into the process to drive improving standards. This is fundamental and needs to be addressed. There is also still excessive use of the word 'should', which has no way of being assessed and therefore has no place in an audited standard.

In relation to the auditing and assessment for eligibility or compliance process; we think it is impossible to comment fully on the standards presented in this document in the absence of detailed guidelines for auditors, and information on how these will be applied to the standards.

In addition, there are numerous parasites other than sea lice that infect farmed salmon and are transferable to other fish (e.g. *Gyrodactylus salaris*, *Parvicapsula*, microsporidians, etc). It may be beneficial to add a standard that is more specific to pathogen management, rather than just referring and relying on an "area-based management scheme" that only loosely touches on the issue.

3.1.1. Participation in an effective area-based scheme for managing disease and resistance to treatments. This includes production levels, coordinated application of treatments, rotation of different treatments, open communication about treatment, monitoring schemes, stocking and transport.
We support the principles of area based management schemes, but stress that in order to manage the cumulative impact of salmon farms the process, these schemes must be entirely transparent, with data sharing and communication between fish farms and all other stakeholders, including wild fish interests. All data must be in its 'raw' form and made available easily and quickly to anyone who wants to see it.

3.1.4. Weekly on farm testing for sea lice, with test results made easily publicly available within 7 days of testing.

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We support this principle, but would reiterate that it must be made clear in the document that this data, and any other data, must be in its 'raw' form and not already analysed/amalgamated/sanitised in any way.

3.1.5 In areas with wild salmonids, evidence of data, and the farms understanding of the data, around salmonid migration routes, migration timing and stock productivity in major waterways within 50 km of the farm.
In the rationale, it states farms do not need to conduct research on migration routes, timing and health of wild stocks, but must 'demonstrate' an understanding. It is not clear what 'demonstrate' means. It is not clear what happens in the many areas where this information does not exist. This is not clear in the guidance. If the industry needs to fund research in order to answer these questions in order to be eligible for the certification this must be made clear. Also, the guidelines on how the research should be conducted need to be consulted upon. Certainly, any monitoring protocol must be so designed not to damage already vulnerable native wild salmonid stocks.

3.1.7. In areas of wild salmonids, maximum on-farm lice levels during sensitive periods for wild fish; Option A (0.1 mature female lice per farmed fish), or Option B (0.1 mature female lice per farmed fish but only if monitoring of lice levels in wild populations exceeds a certain threshold).
We are very concerned that this indicator does not address the key concern here which is infection pressure. 0.1 lice per fish on large farm, or during juvenile migration timeframe may still not adequate to protect wild fish. The size of the farm is critical in deciding whether or not too many juvenile lice are being produced by the farm.

We would like to remind the Steering Committee of the international goal set by NASCO, which many of our countries have signed up to - '100% of farms to have effective sea lice management such that there is no increase in sea lice loads or lice induced mortality of wild salmonids attributable to the farm'. We do not feel that as it stands this international goal can be delivered by this standard. Fundamentally we feel that where it is not practical given the proximity of sensitive wild salmonid fish or migration runs to existing farms, the standard must require the farm to be relocated or change production to closed containment before it can be considered in the process.

Criterion 3.2 Introduction of non-native species
We believe farms with non-native species should only be certified if farmed in enclosed systems, where they cannot impact native wildlife.

Criterion 3.3 Introduction of transgenic species
We support the ban on use of transgenic fish because of the unknown impact on wild populations.

Criterion 3.4 Escapes
We are concerned that the escapes section is not precautionary enough to protect all wild salmonids. The escapement of up to 300 fish, allowed in one production cycle, could be catastrophic to some already small/degraded wild salmon populations, such as those on the west coast of Scotland.

Finally, with regard to the use of the various sea-lice treatments, we think it would be sensible, even at this late date, to propose a new standard (5.3.3) which should require farms to report, on a publicly-available database, within 7 days of the event, any lack of efficacy or suspected resistance in any sea-lice treatments.

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The purpose of this is twofold; it would to alert wild fish interests that sea-lice treatments are failing in a particular area and that wild fish may be unusually at risk, and it would also allow neighbouring farmers and those in the next areas along the coast to consider their selection of sea-lice treatments more carefully.

We question whether these standards have the ability to actually result in a tangible, positive impact on the ground. We also remain very concerned that the standards will damage our work in the future fight for more environmentally sustainable salmon aquaculture and a move towards closed containment, because they will give the general public the perception that ‘environmentally sustainable’ aquaculture already exists through this standard, which we all know is NOT the case.

Yours sincerely,

Paul Knight

Chief Executive

Salmon & Trout Association

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Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: John Barrington
*Organization/Company: Scottish Sea Farms Ltd.
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1		OK	
Principle 2	2.1.	We welcome some of the changes we requested previously ref 2.1.1.Redox Potential for sediment and 2.1.2. ITI for faunal index score. However the modified protocol requires a lot more sampling points than the existing SEPA protocol . Also in 2.1.2., the ITI should be >30 and not >25 , to match SEPA specification.	Remain with the existing SEPA protocol for sampling
	2.1.3.	2.1.3. refers to taxa that are not pollution indicator species. But the 2 most abundant taxa thriving on the waste below the cages, will inevitably be this type of organism .	Remove ref to 'not pollution indicator species'
	2.2.3.	This is a new requirement and is referring to the influence of other sources of nutrient loading, since the nutrient loading due to the salmon and feed should be well understood.	Such sampling and analysis should be carried out by environmental institutions to ensure consistent and competent standards of sampling and analysis.

		To carry out such sampling is too complicated for a farm production unit, due to the number of variables involved. The environmental loggers (oxygen, temp, and current) being installed on farms should give adequate indication of nutrient loading.	
	2.5.	The position on this Criterion is still not acceptable although there has been limited recognition of the need for lethal action as a last resort.	
	2.5.1 and 2.5.2	SSF has site specific management of ADD's which are operated according to the level of challenge from seals. ADD's may be installed but not operated, but ready for operation should seal activity become evident. The above management technique therefore significantly reduces the potential interaction of ADD's with porpoises, dolphins and whales. **Under the Animal Health and Welfare (Scotland) Act 2006,** there is a requirement for salmon farmers to protect their stock, and ADD's are the only viable non lethal alternative currently available.	ADD's should be permitted as part of a hierarchy of seal deterrent activity, in order to reduce the likelihood that a seal would ever have to be shot, or that a fish might escape through damaged nets. Their use should be limited to periods when there is clear evidence of seal activity. ADD systems are being developed with improved triggering mechanisms, and a device operating at sound frequencies closer to the seals hearing range (and therefore less audible to other species) is being tested. There should be a commitment to minimizing the use of ADDs and active participation in research leading to alternative means of control.
	2.5.6	This fixed number does not take into account the variability of predation between sites and regions, and so a maximum of 2 culls per 2 year production period may not be adequate.	Scottish Salmon Industry now operates according to the Scottish Seal Management Code of Practice - as regulated by Marine Scotland Act 2010 – Conservation of Seals. Licenses to legally shoot seals are granted on the basis of local seal population numbers and historical seal predation statistics.
Principle 3	Criterion 3.1. and particularly 3.1.5. to 3.1.8.	There seems to be very little change from the previous standard , so we include our previous response	With ref to 3.1.7. recommend standard follows that stated in Code of Good Practice for Scottish Finfish Aquaculture which states thresholds for

		'This whole section is based on pre-conceived ideas which do not fully take into account the potential interactions between farmed salmon and wild salmonids. There is very little known about how much salmon farming has an effect on the dwindling populations of wild salmonids, with the consensus being that global warming is the most likely cause. There are many other factors which seem to have been left out , including the risk of recently stocked smolt sites becoming infected with sea lice by wild salmonids. For farmers to sample the wild population around their farm is shortsighted and ill-conceived and is likely to have little impact on how the farmer manages any sea lice burden on his stock, but such extensive sampling could have a detrimental effect on the future of the wild population in the area. The farmer's duty is to protect the welfare of his stock and he is legally obliged to do so.	the treatment of salmon for *L.salmonis* ; An average of 0.5 adult female *L.salmonis* per fish during the period 1st February to 30th June inclusive. An average of 1.0 adult female *L.salmonis* per fish during the period 1st July to 31st January inclusive
	3.4.3.	The accuracy of fish counters currently available on the market is not as high as 98%, so this is not a workable standard	Time is required for the development of counting technology with improved accuracy.
Principle 4	4.2.2.	To achieve an FFDRo <2.95, fish oil would have to be substituted by atleast 60% and this would undermine the Omega 3 (particularly EPA/DHA) content and the health benefits of the product. Currently there is not adequate supplies of trimmings oil to supply the industry The SAD is designed to encourage producers to source EPA&DHA from	Impossible for the Scottish Industry to comply and recommend that a 5 year period is provided to allow for adequate volume of MSC (or equivalent) certified fisheries to become available, as well as the development of trimmings oil supplies, and algal EPA/DHA production.

		sources other than fish oil derived from direct industrial fisheries, however such sources do not currently exist in adequate volume.	
	4.7.1	In pursuit of good net hygiene and therefore improved water quality, there is increasing use of in-situ net cleaning equipment. The resulting reduction of number of net changes, means less copper based antifoulant is used. The standard must continue to permit onsite washing of nets treated with copper based antifoulant	On-site net cleaning is an integral part of achieving good net hygiene with minimum disturbance of fish stocks. Five year period should be given to find an alternative treatment which does not have the same impact following net cleaning on-site
Principle 5	5.2.5.	The max cumulative PTI is not a realistic or achievable standard in Scotland Minimising the number of treatments can encourage the allowance of higher lice numbers on fish.	Scottish salmon Industry use of lice treatments is controlled by SEPA and this should be the standard .
Principle 6	OK		
Principle 7	OK		
General comments		At different locations in the SAD document, there are requests for information to be made available to the public eg by website.	Information is available at audit and on individual request if appropriate. Some information has to be submitted to regulatory Authorities eg SEPA , who publish the data on their website.

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1	OK		

Principle 2	OK		
Principle 3	8.7	Accuracy of available counters not as good as 98%, therefore impossible to meet this standard	Need more time for development of counters which can meet this standard
Principle 4	OK		
Principle 5	OK		
Principle 6	OK		
Principle 7	8.24	Unacceptable for Scottish Industry to prohibit use of cages in freshwater lochs where there are native salmonids, since all locations of smolt cages would potentially come under this category, and this would affect more than 50% of smolt production. In the rationale it describes the impacts for concern include the effect of escapes on wild populations, nutrient loading, disease transmission, and antibiotics and chemicals entering the environment. In Scotland (as opposed to Chile) there is no strong evidence that any of these concerns are significant. All of these potential impacts are controlled and monitored by SEPA and Scotland Marine Science. The Industry has reviewed the code of practice for containment in Freshwater, which includes increased technical specification of moorings, cage structure and nets. There are a number of studies to show that escapes do not impact on wild fisheries both in Scotland & Norway.	Floating cages should be permitted in freshwater lochs where native salmonids are present, and SSF will support the existing Scottish regulatory and industry controls to eliminate the impacts of concern. A Scottish Technical Standard for Fish Farm Equipment is being developed with aim of being part of legislation by 2012.

General comments			

SECOND DRAFT, SALMON AQUACULTURE DIALOGUE STANDARDS
Comment from Scottish Salmon Producers' Organisation

The Scottish Salmon Producers' Organisation represents over 95% of Scottish farmed salmon production. Total Scottish farmed salmon production for 2009 was around 135,000 tonnes (whole fish equivalent). This is expected to grow by around 30,000 tonnes in the next five years.

Scotland is therefore a significant global producer of Atlantic salmon, consistently ranking in the top three countries worldwide. The industry already complies with a large number of different voluntary certification schemes, namely The Code of Good Practice for Finfish Aquaculture, Global Gap, Freedom Foods and others.

Following the publication of the first draft of the SAD standard the SSPO responded, commenting on many of the areas which are of interest in Scotland. Potential changes and questions were raised about certain points which we hoped and anticipated would be taken into consideration in the second draft. The second draft does not answer many of the points raised, which is disappointing in this kind of inclusive process of standard development.

The overall view of the standard as it is currently written in draft 2, is that it is an elite and niche standard which is only focused on a very small section of the salmon farming industry with a stated aim of being achievable by only 20% of the industry. In countries like Scotland, it is only a handful of farms which could potentially be able to comply with the range of measures being proposed in this current standard.

There are some major issues with regard to parity with other dialogue standards and perceived equivalence, which we will go into in more detail later. It is also unfortunate that the SAD does not comply with the recently published (Jan 2011) FAO guidelines on aquaculture certification, specifically in areas of Fish Health or Food Safety. Many of the criteria addressed in these guidelines seem to be ignored to accommodate the narrow viewpoint of the NGO sector.

Auditability of the standard as it is in current form is a concern, no thought seems to have been given to how this standard could be operated and audited without bringing a significant cost burden to the farmers. As detailed in our previous comment, there have been, as yet, no estimated costs provided for accreditation of this standard.

There has obviously been a considerable amount of work involved in revising the initial draft, however this has not resulted in a standard which *'…minimize or eliminate the key negative environmental and social impacts of salmon farming, while permitting the industry to remain economically viable.'*

We will not return to all the individual points raised after the first draft, but we would like to point out a number of issues which remain particularly difficult for the salmon farming industry in Scotland.

The changes made to Criterion 1.1 go some way to addressing our concerns about legal compliance with national and EU law. However there are still contradictions later in the document, specifically related to use of ADDs which are currently a vital tool in protecting the welfare of our stock which we have a legal requirement to protect.

We welcome the position that the Steering Committee has come to on Criterion 2.1, the use of site specific AZEs and with regard to the use of different monitoring options. However the position on Criterion 2.5 is still not acceptable although we recognise there has been some movement with respect to the use of lethal force against predators.

The arguments put forward in our previous submission regarding Criterion 3.1 still hold true and there has been very little material change in this version. The interaction between wild and farmed fish has not been well understood in the creation of this standard, especially the increased potential for injury through attempting to get realistic lice data from wild fish.

The position with regard to Criterion 8.24 (was 3.1.1S) remains a difficult one which has not been altered and could not be accepted by the Scottish industry. We believe the proposal would bring this standard into direct conflict with those already existing (Freedom Food) and will also have a significant impact on the carbon footprint of the industry. This is also contradictory to the Trout Dialogue position, where salmonids are permitted to be reared in freshwater net-pen systems. Your arguments for not permitting net-pen systems are flawed, not relevant in the Scottish context and have been unduly influenced by the NGO sector. The lack of parity between standards is clear.

In its current form, the standard is effectively out of reach of our members due to the Steering Committee's inflexibility with regard to the Scottish situation.

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Nigel Edwards
*Organization/Company: Seachill (Division of Icelandic Group UK Ltd)
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
All related to specific farming standards	All except legal compliance and social criteria.	A general comment: The ASC should operate a similar model to the MSC allowing certification once the average score exceeds a threshold level and requiring a minimum score in each area with formally agreed conditions on the certified body that ensure they achieve the threshold score in all areas within the period of certification. This would ensure continuous improvement in the industry and therefore achieve the overall goal of the dialogues. The investments required to achieve certification need to pay back for the companies who are committed to selling ASC certified salmon. It may take several years to create the market demand to justify these investments by extra sales, and early adopters should be encouraged by having certification rewarded with conditional certification. It should be possible to raise the bar for later entrants who are entering an established market.	

Principle 2	2.1.1 – 2.1.3	Our farmed salmon suppliers advise us that the indicators require expensive and not commonly used methodology. They also ask that local natural variation and regional differences be allowed for that would occur in the absence of salmon farming DO is not an effective measure of phytoplankton effects.	We support the comments made by Marine Harvest. "The standard should require monitoring of benthic diversity and benthic effects for a period of two production cycles in order to establish baseline values for the suggested indicators. Following the monitoring period, concrete standards should be set with reference to registered baseline values. Regional differences should be accepted and a tiered approach would be preferable. Requirement to complete taxonomic samples only if chemical threshold exceeded. " "2.2.1 should be removed as it doesn't add value "
	2.2.3	Consideration has to be made of natural background levels of N & P	Set a standard based on a variation from the local background levels measured over a period of at least 3 months.
	2.5.1/2.5.2/2.5.3/2.5.6	The standard allows lethal action against marine mammals, as a last resort, as long as the animal in question is not endangered/red-listed. The standard also calls for the abolition of the acoustic scaring devices that are effective in keeping seals away from the farms, thus avoiding the need for lethal action. Research into alternative ADDs by the Sea Mammal Research Unit (St Andrew's University) is focussing on a new startle response seal scaring system which does not harm seals or cetaceans. We believe the use of ADDs should be allowed combined with site specific risk assessments.	The use of ADDs should be allowed with site specific risk assessments in place to ensure the method used is optimal locally. If the above request is not accepted the standard would need to allow for killing of at least 5 marine mammals over the prior two years (2.5.6)

Principle 3	3.1.2	The salmon farming organisations generally consist of complex groups of farms under central management. It is the culture and commitments made by the large company that needs to be demonstrated.	Not required for each individual farm, but required at the company level.
	3.1.5	We fully support the need for standards under criterion 3.1 to reduce sea lice infection pressure on wild salmon as they migrate out to sea but the wording needs to be more specific.	Footnote 29 should refer only to wild salmonid migration routes (remove habitat)
	3.1.7	We support option B as it offers control of sea lice without excessive use of treatments that could lead to resistance developing in the lice. It also minimises the environmental impact of the treatments.	Option B is the best alternative
	3.4.3	This is a good aspiration but we are advised that is not possible to reach this level of accuracy today consistently. New counting equipment is under development that should make it possible in the future	The standard should allow a period to move from 95 > 98% but we are not sufficiently expert to suggest this period.
Principle 4	4.2.2	As chair of the EATiP thematic area for human health and nutrition I have listened to compelling arguments for the health benefits from consumption of EPA and DHA from oily fish. The health benefits are considerable and we have a responsibility to ensure the human consumption is maximized within the constraints of the sustainable productivity of the fisheries concerned. Due to the high levels of sustainable harvests of small pelagic fisheries it is not realistic to divert this material to direct human consumption. There is insufficient demand (and consumer preference for these species). Feeding these small oily fish to salmon is the most efficient way to deliver the human EPA and DHA health benefits in an animal feed format. The potential negative impact of the current dialogue standard is to divert these precious fish oils and oily fish meal into land animal feed where much of the human health benefits will be wasted. Fishermen catching small oily pelagic fish in a sustainable fishery should have access to the highest value markets for their catch.	The standard should allow unlimited use of certified sustainable fish in feed that meet the certification criteria in 4.3.1. Alternatively a greater proportion of EPA and DHA or a larger FFDRo should be allowed for certified fisheries and the current wording should be restricted to non certified sources of fishmeal and oil.

	4.7.4	The local natural background levels of Cu should be measured.	The standard should require a local background Cu measurement and set a limit on the variation from the local mean due to farm discharge.
Principle 5	5.1.7	Many farms will have such low levels of mortalities that a reduction program is not required.	Standard to require a mortality reduction program for sites that have mortality rates above 10% for 2 or more cycles.
	5.2.8/8.17	As far as we know there are no infectious diseases that can be transferred from salmon to humans. We have consulted with the vets that advise our suppliers and they are asking for salmon farmers to be allowed to use antibiotics that are on the WHO list as a last resort for treating bacterial diseases. They need to be able to rotate the use of drugs to avoid drug resistance developing.	Allow vets to make decisions on drug use locally based on a risk assessment for critically important antibiotics (5.2.7/8.16)
	5.3.2	In regions where only one type of treatment is allowed, this standard is not possible to meet	
	5.4.3	Refitting wellboats is costly and time consuming. The standard should allow a reasonable transition period	The standard should give a transition period of three years after the ASC standard has been published for having the described equipment in place
Principle 7	7.1.3	No human health risks have been established with respect to therapeutants used on salmon farms. In the absence of evidence the SAD cannot require antibiotic warning signs.	Delete this requirement from the standard.
Principle 8	8.24	The salmon industry should be allowed a period in which to invest in land based smolt production and phase out freshwater loch smolt cages. They should be allowed in water bodies that can be shown to assimilate the discharges from the cages. The Scottish salmon and trout industries are working collaboratively on a Freshwater Containment Code of Practice. A draft should be available in October 2011. The Trout dialogue standards allow trout rearing in freshwater in net pen systems.	The standard should allow for a transition period in phasing out freshwater cage production. Production must be undertaken within the assimilative capacity of the water body One or more escapes events shall result in withdrawal of certification

MONTEREY BAY AQUARIUM

Comments on the Salmon Aquaculture Dialogue Standard

Version date May 16 2011

Submitted June 14 20111 via email.

Dear SAD Steering Committee,

From our participation on the shrimp dialogue steering committee we recognize the huge amount of work involved in developing this latest version of the standards; also the complexity of the issues involved and the lack of 'off-the-shelf' solutions to many of the issues or impacts. In this context, developing a "responsible" salmon aquaculture standard for use by the Aquaculture Stewardship Council is challenging and we offer the following general and specific comments:

General Comments

<u>Method of production and economic viability.</u>

The stated goal of the standards is to: "*credibly develop measurable, performance-based standards that minimize or eliminate the key negative environmental and social impacts of salmon farming, while permitting the industry to remain economically viable*".

Last year Seafood Watch released a green 'Best Choice' recommendation for the inland (freshwater) production of farmed salmon in tank-based systems. With high market demand, the company used as the reference for this recommendation has since expanded to two new and much larger facilities.

While these production systems might have worse performance than net-pen farms in some impact categories, there are many places in the standards where they have the potential to "*minimize or eliminate*" some of the "*key negative environmental and social impacts of salmon farming*", particularly the key impacts on wild salmonids. Yet it seems that the need to "*permit the industry to remain economically viable*" and therefore the perceived economic need to continue using the fundamentally flawed open-net-pen production system prevailed in the setting of many sections of the standards. We have highlighted some of these sections in the more detailed notes below.

Unit of certification

The document states: "*The unit of certification is a farming site. In undergoing assessment for certification, a company that owns multiple grow-out sites will be subject to compliance only at the particular site(s) for which they choose to undergo certification*". Yet the next sentence states "*A farm must comply with all the standards in this document to be certified*" and later "*These principles—along with the corresponding criteria, indicators and standards—are applicable at the farm level*" (page 11). Appendix II applies to: "*all farms owned by a company*".

While it is logical to have standards that apply at different levels, in developing a transparent and trustworthy certification system that organizations such as Seafood Watch would be willing to publically support, it is essential that the potential for loopholes or other ways to avoid responsibility be eliminated. For example, could a farm have multiple sites that impact sensitive habitats, but only choose to certify their one site that doesn't? Can these other sites owned by the same farm or company also have higher sea lice numbers, higher levels of escape, use child labor and so on?

If a certified site had an escape, could the farm replace the escaped fish with some from a non-certified site and say the escape happened there instead?

There are many instances in the standards where this lack of clarity could be accidentally or intentionally interpreted in different ways. Whatever the unit of certification is, it must be able to demonstrate independent management from non-certified fish, cages, sites, farms or companies.

Justification of the title "Responsible" and justification of use by the Aquaculture Stewardship Council

It is clear that the SAD has done a thorough job of developing the standards and explored a wide variety of potential solutions. If we ignore the availability of closed systems and the false pretence that the current net-pen production system is the only economically viable option, then these standards are probably a good representation of current best practice in the global net-pen salmon farming industry. What is clear however is that despite these efforts and best practices, there remain many significant impacts of concern.

In the wake of the SAD's substantial efforts, and considering the dearth of solutions for a fundamentally flawed production system, we do not have many specific comments or suggestions for substantial improvements to the current draft. The question remains as to whether the standards justify the title of "responsible" or whatever other words will be used by the ASC or certified producers to promote their certified products.

A certified farm could:

- consume the fish oil from almost three tons of wild fish for every ton of farmed salmon produced, plus a variety of other feed ingredients that have their own impacts of production
- waste up to 65% of the protein supplied in those feed ingredients and discharge it directly into the local environment as effluent pollution
- suffer 20% mortality each cycle (and waste another 20% of the feed resources)
- allow 300 fish to escape every production cycle
- have tens of thousands of mature parasites per site releasing infectious life stages
- be totally dependent on chemical veterinary treatments, and discharge those chemical treatments into the surrounding water body.

The Global Aquaculture Performance Indicator project (GAPI) interestingly concluded that net-pen farmed salmon performed well compared to other open-water marine finfish farming systems on a per ton basis. This was contrasted by poor performance on a cumulative industry wide basis. While the original (if unwritten) intent of the dialogues was to represent the top 20% of producers, the establishment of farm-level certification risks many farms becoming certified individually as "responsible" yet performing irresponsibly or unsustainably as a group. Addressing the cumulative impacts of salmon farming at the industry level remains a huge challenge for all farm-level certification programs.

<u>Next steps – evaluation and support</u>

Many organizations including Seafood Watch will assess and evaluate these and other developing aquaculture standards and decide to support them as representative of best practice and leadership within the (net-pen) industry, wait until they improve further before recommending consumers and seafood buyers to buy labeled products, or potentially recommend buyers to avoid these products. A robust assessment is not yet possible without complete guidance documents and knowledge of the ASC's management of the certification process.

We recommend the SAD steering committee retain control over the development of the guidance documents as these are critical to the final product, and that it continues to be actively involved in the ASC's implementation of the standards.

Specific comments

<u>Principle 2</u>

There are no effluent or waste standards that could apply to closed containment or land based farms. Closed containment, if managed correctly, could eliminate this impact category, yet it is not recognized, relevant or even acknowledged in this section.

There are no effluent standards that apply to freshwater production of salmon in net pens (e.g. as practiced in New Zealand). It appears the smolt standards could be used for this.

Criterion 2.1

For net-pen farms, the AZE must be located relative to the prevailing tide or currents. Without the "robust and credible modeling system" (2.1.4), the auditor could be assessing the wrong (i.e. a non-impacted) area of seabed.

Criterion 2.3 Nutrient release from production

Propose to change the title as it does not relate to the indicator. Or consider deleting this criterion as the impacts are either already assessed in Criteria 2.1 and 2.2 as effluent impacts or (along with other uneaten feed) in the feed principle (4).

Indicator 2.4.1- We suggest clarifying how this applies at the farm or the site level. We also suggest clarifying if it applies to habitats or species distant from the farm site which are impacted by migratory escapes?

<u>Principle 3</u>

Robust, timely and spatially relevant wild fish monitoring does not seem to be practical in the production areas home to wild salmon populations. Regulatory bodies have been at best slow to recognize the connection between salmon farm lice and wild fish; recent papers have confirmed the link, but regulatory recognition and adoption of appropriate precautions are likely to be slow or non-existent for some years. Therefore the SAD should use the more reliable option A in 3.1.7, but should critically include an additional criteria that accounts for the number of fish on site (or Area Based Management area) and therefore the site's (or ABM's) total lice infection pressure. This appears to be partially covered by 3.1.3 (and referred to as "loads" instead of "levels"), but there are no specific standards or values.

It is essential to realize the limitations of certification programs based on annual audits and the ease with which farm-level monitoring data (such as sea lice numbers) can be fabricated. It is essential that the ASC incorporates sufficient random monitoring or other methods to reduce this risk. Certification standards or auditors must also not consider information from veterinarians (whose businesses are dependent on salmon farming) to be independent.

We recognize the disease technical working group's report conclusions that evidence of pathogen transfer from farm to wild (other than parasites) is inconclusive, yet there is no mention or 'safety net' in the standards should evidence of such transmission from farmed to wild fish become available. We recommend that a standard be added stating that production should be ceased in the event that infection or mortality of wild salmon is linked to a certified farm.

Criterion 3.3 – We fully support the prohibition of transgenic salmon.

Criterion 3.4 – Escapes
What is the unit of certification? The indicators all refer to the farm level; is this correct? Does the 300 maximum escapes refer to the total from all the farm's sites? Does it include the sites that are not certified? Or could the farm have some uncertified exposed sites that suffer repeated escapes but still pass the other certified sites?

While there is no easy way to correlate escape numbers to actual impacts on wild salmon populations, we question whether the standards are strict enough at the farm or ABM level where multiples sites could release up to 300 escapees into the same water body or area.
We are also keen to see how farm certification or de-certification will be managed in relation to the counting accuracy requirements of 3.4.3. Will the farm be ineligible for certification (or decertified) if it cannot count to >98% accuracy?

<u>Principle 4 – Feed</u>
In keeping with all our dialogue comments, we encourage the development of a feed mill standard with a dedicated audit.

Indicator 4.2.2 – We propose to delete the EPA and DHA option as using the fixed values (5 or 7% oil yield and the 20 or 30% DHA+EPA levels) provided gives essentially the same results as weighted average calculations of FFDR for fish oil. Alternatively, move this to the annex as an alternative calculation for FFDRoil.

It is difficult to justify either of the standard values in 4.2.2 as representing "responsible" salmon farming.

If you choose to keep 4.2.2 for EPA and DHA, delete the word "maximum" from the indicator as this is implied by the standard value of <30g/kg. Also clarify the text in Appendix IV (section 1, top of page 78) which refers to groups a and b, but does not define them.

Indicator 4.2.3 – Ensure that it is clear that this applies to the whole feed; i.e. all the protein ingredients used whether aquatic, crop, animal, or by-products of any of these groups.

Indicator 4.7.4 Clarify that this copper concentration applies outside the AZE. This level seems high compared to the sensitivity of potentially affected aquatic organisms. It seems the use of on-site net cleaning would be preferable.

<u>Principle 5</u>

5.1.2 – Is this veterinary visit to each site or to the "farm"?

Indicator 5.1.5 and 5.1.6 allow 20% mortality in every production cycle. They allow 8% of the total stock to be unexplained mortalities in each production cycle. This seems very high, and not appropriate in a "responsible" animal production standard.

Indicator 5.1.6 Specifies "for farms", but should this be "sites"

Indicator 5.2.5 - Footnote referring to hydrogen peroxide. Hydrogen peroxide was used frequently many years ago to treat sea lice but was unpleasant to use, not great for fish welfare, and not very effective across different lice life stages.. Its use was phased out when the more effective and controlled sea lice treatments such as Slice and Excis became available. Now the only reason it is being used again is that the preferred treatments have been abused (due to repeated outbreaks of parasitic sea lice in a flawed farming system) and resistance is now becoming common. Use of hydrogen peroxide should therefore be considered as warning sign of unsustainable production, not something to be encouraged or tolerated in the standards.

5.2.5 The PTI concept appears to be robust mathematically, but must be accompanied by detailed guidance to avoid misuse from calculations on fish size, numbers, total biomass and/or movements of fish between cages or partial treatments on the same site. A bath treatment on a cage has the same chemical discharge regardless of the size of the fish in the cage. With the use of well boats, the discharge of active chemical treatments should not be tolerated in the standards.

5.2.7 and 5.2.8 - We support these standards, but do not support the footnote caveat. These standards should be applied to the highest level possible by the ASC – i.e. at minimum all the pens on the site should comply, better that all the sites owned by the farm comply, optimal that all the farms owned by a company comply.

Criterion 5.3 Resistance to sea lice treatments
If resistance has been identified, and particularly if fish have to be prematurely harvested, they must not be permitted to be sold as certified "responsible" as they clearly are not. If the farm doesn't have alternative treatments available then it should not be allowed to continue certified production.

<u>Appendix 1</u>
Section 3, 1c is not needed – it is covered in 1a. Economic value is not important in this section.

<u>Appendix 2</u>
States "*All farms owned by the company applying for certification in the area must participate in the ABM*". Clarify the unit of certification site, farm or company?

<u>Appendix 4</u>
Section 1, second sentence; delete "*This measure can be weighted for fishmeal (FM) or fish oil (FO), whichever component creates a larger burden of wild fish in feed*". You already have separate FFDR equations for FM and FO, and separate standards, so there is no weighting involved across these two components. Weighting is possible within either FM or FO over the growout period, but clarify that this is the intent.

The FFDRmeal equation has 22.2%, but the text mentions 24% and references Peron et al 2010. This Peron paper is not clear in terms of the weightings applied and the total fishery sources and values analyzed. We recommend continuing to use 22.2%.

Thank you for the opportunity to comment

Peter Bridson
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Monterey Bay Aquarium
pbridson@mbayaq.org

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Andy Ottaway
*Organization/Company: Seal protection Action Group
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2	2.4	The phasing out of ADDs within two years may be used to justify increased shooting of seals including common seals in Scotland which are in serious decline.	The Seals Aquaculture and Salmon Working Group is looking into alternatives, and would like to discuss this section with you. The phasing out of ADDs must not be used to justify increased seal killings We are working with a leading UK retailer, the RSPCA, SMRU and Marine Harvest amongst others to address this issue. I am not aware of any contact between the drafters of the SADS with those that have existing standards already set on Aquaculture such as the RSPCA Freedom Food Scheme.
Principle 3			
Principle 4			

Principle 5			
Principle 6			
Principle 7			
General comments			

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3			
Principle 4			
Principle 5			
Principle 6			
Principle 7			
General comments			

Salmon Aquaculture Dialogue

General Comments on the 2nd Draft Standards for Responsible Salmon Aquaculture

Skretting has once again reviewed the draft standards for responsible salmon aquaculture and our comments and suggestions for changes to specific criteria, indicators and standards are collected in the attached "Comment form for Draft Salmon Aquaculture Dialogue Standards".

Skretting has continued to be represented on the Steering Committee of the Salmon Aquaculture Dialogue. In our opinion, this representation has a wider responsibility than solely being an advocate for the view of Skretting as a company. Therefore, we feel that once again, it is also appropriate for Skretting to make comments to these standards from a company perspective, as a stakeholder of the dialogue in line with all other stakeholders of the dialogue.

We have commented upon numerous Principles within the Standard in detail. However, at this point, we specifically draw attention to the future challenge regarding uncertainty of supply of ISEAL accredited marine materials (Principle 4.3.1). Additionally, the conflict between optimal use of fish oil and the desire to maintain the current moderate to high levels of long-chain omega 3 polyunsaturated fatty acids (LC n-3 PUFAs) in salmon flesh will undoubtedly be a barrier to entry for many salmon growers.

In our mission statement we say that "*Skretting will deliver outstanding nutrition and services to fish farmers worldwide for the sustainable production of healthy and delicious fish".* The standards for Responsible Salmon Aquaculture have the potential to become an important asset in promoting the sustainable production of farmed salmon. In common with our response to the first draft of the standards, we again feel that an opportunity to improve the overall attainment of the industry has been missed due to the setting of the 2nd draft standard at a level which will discourage participation by many responsible farming companies.

Best regards of behalf of Skretting

Paul Morris

Dr. Paul Morris
Business Development Manager

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 1: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14 2011.

*Name: **Paul Morris**
*Organization/Company: **Skretting**
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT –

Principle + Indicator	**Criteria/Indicator /Standard**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2.3.1	Percentage of fines in the feed at point of entry to the farm (measured according to methodology in Appendix I subsection 2) / <1% by weight of the feed	On the basis of measurement prior to feed delivery system i.e at farm gate, then this should not be an issue. However, in the Rational it states that "*it addresses the efficient and proper transport, storage and physical delivery of feed pellets to* ***the net***." By measuring "at farm gate" the stated rational is not met, as the process of feed delivery to the cage is not addressed.	If the intention is to control feed quality at the point of delivery to the site (at farm gate), remove "*physical delivery of feed pellets to the net*" from the rational. Alternatively, if there is still an intention to minimise dust and chips at the instant of feeding the fish, prescribe an upper tolerance for damage by feeding systems
Principle 3			
Principle 4 (intro')	The mass-balance approach	The level at which mass-balance can be applied is not sufficiently clear. There is a need to clarify how the mass balance approach will operate and how that will apply to allocation of fishmeal / oil from trimmings to participants in the scheme in preference to non-participants. Additionally, feed manufacturers may operate multiple plants within a single company and / or import feeds from sister companies within a global group. The ability to	Define the rules for mass balance more clearly and establish whether offsetting purchases of raw materials between plants within a single country or indeed, by a vendor who purchases feed from a non-participating sister company is sufficient to fulfill the needs of the scheme

		offset feed materials purchased as part of a complete feed from non-participating factories needs to be addressed	
Principle 4.1.1	Presence and evidence of traceability of all raw feed ingredients with regard to country of origin and of a certified chain of custody to the level of detail needed to meet the standards under Principle 4 / Yes	OK	
Principle 4.2.1	Fishmeal Forage Fish Dependency Ratio (FFDRm) for grow-out (calculated using formulas in Appendix IV, / <1.35	Achievement of good eFCR is a pre-requisite for delivering this principle. Otherwise, no issues in delivering this Principle where there is no conflict with other standards e.g. Label Rouge.	
Principle 4.2.2	Fish oil Forage Fish Dependency Ratio (FFDRo) for grow-out (calculated using formulas in Appendix IV, subsection 1), OR Maximum amount of EPA and DHA from direct marine sources (calculated according to Appendix IV, subsection 2) / FFDRo <2.95 or (EPA + DHA) < 30 g/kg feed	Likely to be a significant barrier to entry to many growers in Canada, Chile and particularly Scotland where this constraint will conflict with the desire to grow salmon with moderate to high levels of LC n-3 PUFAS in order to meet retailer / quality scheme requirements. Skretting can deliver this principle but many customers will decide not to enter the SAD scheme for this reason	
Principle 4.2.3	Protein Retention Efficiency (PRE) for grow-out (calculated using formulas in Appendix IV, subsection 3) / ≥35%	OK	
Principle 4.3.1	Timeframe for all fishmeal and fish oil used in feed to come from fisheries certified under a scheme that is ISEAL accredited and has guidelines that specifically promote responsible environmental	Although some fisheries are entering the MSC scheme e.g. the Gulf of California sardine fishery, the ability of fish feed companies to source ISEAL fishmeal / oil within the next 5 years is not guaranteed because there is no certainty that such materials will still be available 5 years post-publication of the standard. Consequently,	Until sufficient quantities for ISEAL fishmeal / oil are proven to be available to meet the needs of the standard, Principle 4.3.1. should be withdrawn from the standard. Instead, Principle 4.3.2 (subject to timely and periodic revision) should form the

	management of small pelagic fisheries / <5 years after the date of publication of the SAD standards	companies adopting the scheme now may find that in 5 years time, they are unable to continue in the scheme due to a shortage of available ISEAL material in the future.	objective for fishery sustainability in the SAD standard. If / when suitable ISEAL accredited fishmeal / oil were to become available in future then, 4.3.1 could be resurrected in future revisions but, it should not be a constraint in the initial standard.
Principle 4.3.2	Prior to achieving 4.3.1, the FishSource score for the fishery(ies) from which all marine raw material in feed is derived. (See Appendix IV, subsection 4 for explanation of FishSource scoring) / All individual scores ≥6, and biomass score ≥8	OK	
Principle 4.3.3	Prior to achieving 4.3.1, demonstration of chain of custody and traceability for fisheries products in feed through an ISEAL accredited or ISO 65 compliant certification scheme that also incorporates the FAO Code of Conduct for Responsible Fisheries / Yes	OK	
Principle 4.3.4	Feed containing fishmeal and/or fish oil originating from by-products or trimmings from IUU49 catch or from fish species which are categorized as vulnerable, endangered or critically endangered, according to the IUCN Red List of Threatened Species / None	OK	
Principle 4.4.1	Presence and evidence of a responsible sourcing policy for the feed manufacturer for feed ingredients which comply with	OK	

	recognized crop moratoriums and local laws / Yes		
Principle 4.4.2	Percentage of soya or soya derived ingredients in the feed that are certified by the Roundtable for Responsible Soy (RTRS) or equivalent / 100%, within 5 years of the publication of the SAD standards	Degree of compliance will be determined by the number of suppliers which become certified by the RTRS or equivalent and RTRS has not yet rolled out its standard. Soya need not necessarily come from RTRS suppliers if schemes like ProTerra are considered to have equivalent value. If non-GM is going to remain a requirement for UK / Norwegian salmon producers, Brazilian soya growers will have to subscribe to RTRS because Brazil remains the only significant supplier of non-GM material. Access to material on the mass balance basis will make this requirement more manageable	
Principle 4.4.3	Evidence of disclosure to the buyer of the salmon of inclusion of transgenic plant raw material, or raw materials derived from transgenic plants, in the feed / Yes, for each individual raw material containing > 1% transgenics	We can disclose the content of transgenic plant material in the feed to the farmer, it is then up to the salmon farmer to disclose to their customers.	
Principle 4.5.1	Presence and evidence of a functioning policy for proper and responsible treatment of non-biological waste from production (e.g., disposal and recycling) / Yes	OK	
Principle 4.6.3	Documentation of GHG emissions of the feed used during the previous production cycle (See Appendix V subsection 2 for guidance and requirement components of the assessment) / Yes, within 3 years of the publication of the SAD standards	A large amount of work will be required to supply this information and the future scope and ambitions of this Principle are unclear.	
General			

comments			

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION (SECTION 8 of document)

Indicator/Standard (e.g., 8.4 or 8.22)	**Comment(s)**	**Proposed solution or amendment**
General comments on smolt standards		

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TIER IM RECHT

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June 14, 2011 (by EMail)

Comments on the second draft of standards for responsible Salmon aquaculture by the Salmon Aquaculture Dialogue (SAD2)

Dear Katherine

Dear members of the FTAD steering committee

Thank you for the opportunity to comment on your second draft again. Like the first time, we focus on the two following issues.

Animal welfare

SAD2, page 7

Animal welfare (i.e., farmed fish welfare and wildlife interactions, including treatment of and impacts on predators) has been raised by some stakeholders as an issue for the SAD to address. Wildlife interactions will be addressed under Principle 2. The SC has decided, however, not to comprehensively address farmed fish welfare in the standards document, as the SC believes that 1.) farmed fish welfare does not fall under the mandate of the SAD and was not part of the rationale for creating the SAD, 2.) the SC does not have appropriate expertise on the issue, 3.) other fish welfare standards and processes already exist, and 4.) there is potential to partner in the future with other certification programs that address farmed fish welfare. The SC expects that some aspects of farmed fish welfare will be addressed, indirectly, under the standards (e.g., through several environmental and fish health standards).

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Draft 2 does still not directly address animal welfare. It is true that some other standards adress this, but they represent but a very small part of the market, so this is rather a weak

excuse as in reality, practically all future ASC certified Salmon farms will not apply any animal welfare standrads at all.

A standard backed by big WWF could make a change – and should, we feel. **We therefore remind you of our input to draft 1** and would like to underline the following:

1. Any certification scheme for aquaculture should address animal welfare as it is, together with ecology and sustainability issues, **the core concern.** Aquaculture is about rearing and treating animals first of all.

If you are really to set up a standard for responsible Salmon farming without addressing issues like ethology and «humane slaughter», you resp. the farmers who follow your standard will sure have to correct this in future – then certainly under pressure of consumers instead of proactively by your own will.

We again strongly advise you to search for experts in fish ethology and invite them to your dialogue. We would like to offer our help in making contacts to relevant persons.

2. Fish welfare is more than just health of the fish. Fish health is an outcome of fish welfare. Conversely, factors enhancing fish welfare do of course embrace fish health, but many other factors are responsible also, e. g.:

- species appropriate structure of the artificial habitat (allowing a variety of flow velocities, light/shadow, withdrawal of subdominant individuals, a.s.o.)
- species appropriate stocking density (which is a component of fish welfare and not to be discussed with regard to fish health solely)
- avoidance of rapid temperature changes, of noise and freightening
- minimum requirements for handling, transportation, stunning and killing
- minimum requirements for rearing practices (species engineering)
- a.s.o.

3. **Lack of animal welfare** in a fish farm is directly linked with a range of subsequent issues which, by the way, have economical consequences:

- increased disposition to disease and increased rates of medicamentous treatment
- increased inclination to (genetically) engineer the species in order to render the animals more «robust»
- increased tendency to escape from unappropriate living conditions
- increased mortality
- loss of flesh quality

It is hard to understand how a scheme fostered by WWF and other NGOs can just look away when it comes to the «leading characters» in aquaculture.

SAD2, page 31

Criterion 4.2 Use of wild fish for feed

INDICATOR	*STANDARD*
4.2.1 Fishmeal Forage Fish Dependency Ratio (FFDRm) for grow-out (calculated using formulas in Appendix IV, subsection 1)	*<1.35*
4.2.2 Fish oil Forage Fish Dependency Ratio (FFDRo) for grow- out (calculated using formulas in Appendix IV, subsection 1) *OR* *Maximum amount of EPA and DHA from direct marine sources (calculated according to Appendix IV, subsection 2)*	*FFDRo <2.95* *or* *(EPA + DHA) < 30 g/kg feed*
4.2.3 Protein Retention Efficiency (PRE) for grow-out (calculated using formulas in Appendix IV, subsection 3)	*≥35%*

SAD2, page 32

Rationale

The Salmon aquaculture industry has significantly reduced the inclusion rates of fishmeal and fish oil from forage fish in Salmon feeds during the past two decades. The Forage Fish Dependency Ratios (FFDR) contained in these standards aim to support the trend toward lower inclusion rates and increasingly efficient use of marine resources, which are expected to continue. Fishmeal and fish oil are both finite resources that must be shared across a range of users with increasing demands, from direct human consumption to aquaculture to pig and poultry production. The SAD intends to promote the efficient use of these resources, producing increasing amounts of farmed Salmon from a given input of fishmeal and oil.

1. Generally, one would expect that an aquaculture standard fostered by WWF and other NGOs sets a top priority in reducing wild fish consumption for fish feed.

The reduction of use of forage fish is **not only an issue of stock preservation but also a major animal welfare concern.** Counted in individuals, the predominant majority of wild fish caught are destinated for the production of fishmeal and fish oil, mainly for feeding purposes in aquaculture.
The industrial fishing methods applied onto these stocks do not address the suffering of the animals in any way, neither during the catch by huge nets nor during the slaughter process. While wild fish in general are treated like a unconscious biomass, this is all the more true for the catch of forage fish.

We acknowlegde that predators like Salmons cannot (yet) be fed without any fish (which as a matter of fact is a much critized fact with most species farmed for the markets in Europe and Northern America. But the **development of a fully fishery independent aquculture** should be taken serious as a goal to be reached, and the definition of an overall reduction of the FIFO would enhance such development.

With regard to the forage fish still needed until then, it is of course crucial to define the stocks which can be sustainably used. Given the continuous and fast growth of the aquaculture industry, we feel the problem of sustainable sourcing is quite bigger that the pro domo solution presented by FTAD. **Why do you consider ISEAL and MSC as the only instruments to guarantuee appropriate catch?** Why not include forage fisheries already certified by Friend of he Sea in good quantities?

SAD2, page 33

Criterion 4.3 Source of marine raw materials

INDICATOR	*STANDARD*
4.3.1 Timeframe for all fishmeal and fish oil used in feed to come from fisheries certified under a scheme that is ISEAL accredited and has guidelines that specifically promote responsible environmental management of small pelagic fisheries promote responsible environmental management of small pelagic fisheries	*<5 years after the date of publication of the SAD standards*
4.3.2 Prior to achieving 4.3.1, the FishSource score for the fishery(ies) from which all marine raw material in feed is derived. (See Appendix IV, subsection 4 for explanation of FishSource scoring)	*All individual scores ≥6, and biomass score ≥8*
4.3.3 Prior to achieving 4.3.1, demonstration of chain of custody and traceability for fisheries products in feed through an ISEAL accredited or ISO 65 compliant certification scheme that also incorporates the FAO47	*Yes*
4.3.4 Feed containing fishmeal and/or fish oil originating from by-products48 or trimmings from IUU49 catch or from fish species which are categorized as vulnerable, endangered or critically endangered, according to the IUCN Red List of Threatened Species50	*Non*

SAD2, page 77

1. Forage Fish Dependency Ratio calculation

Feed Fish Dependency Ratio (FFDR) is the quantity of wild fish used per quantity of cultured fish produced. This measure can be weighted for fishmeal or fish oil, whichever component creates a larger burden of wild fish in feed. In the case of Salmon at current status, the fish oil usually will be the determining factor for the FFDR. The dependency on wild forage fish resources should be calculated for fishmeal and fish oil using the formulas provided below. In this standard, it is the highest number (i.e., dependency) that is relevant and which must be used. This formula calculates the dependency of a single site on wild forage fish resources, independent of any other farm.

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

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

Compared with draft 1, we do not see much improvement in draft 2.

We therefore remind you of our input to draft 1 and would like to underlien the following:

2. The formulas presented in the draft are too complicated in practice – and too permissive instead of reducing resolutely the FIFO to an absolute minimum.

3. We advocate a more determined and more pragmatical formula which clearly limits the use of forage wild fish to one-fifth of the farmed fish weight while making best use of fish by-products and waste fish, as defined in the fair-fish standard for aquaculture:

> 6.1 Feed components that originate from wild fish caught for feeding purpose may not exceed a fish in : fish out ratio (FIFO) of 0.2 : 1.0 on the farm in question, i. e. for the production of 1 kg farmed fish (harvest live weight) at the most 200 g of wild fish (live weight) may be fed.
> This FIFO does not embrace:
>
> - Fishmeal and fish oil which verifiably origin from by-products (trimmings) of processed farmed fish, but at the maximum the weight that can be produced out of the by-products provided by the farm in question.
> - Fishmeal and fish oil which stem from the following sources but do not exceed a maximum of 30% of the total of fishmeal and fish oil employed by the farm in question:
>   - by-products of fish (certified or not)
>   - not marketable fish from certified sustainable fisheries
>   - not marketable fish which had to be fished away by directive of the competent fishing authority in order to keep up the ecosystem's equilibrium
>
> 6.2 As far as available, the farm in question employs fishmeal and fish oil products approved by one of the following certification schemes: fair-fish, a bio-label, MSC or Friend of the Sea.
>
> 6.3 Fishmeal or fish oil it shall not originate from the species to be fed.

4. Such a formula can be managed by the feed producer and be controlled alongside with other criteria for fish feed.

In practice, for Salmon farming this would mean a farm could employ fishmeal up to the following amount per kg of farmed fish (harvest live weight):

- 22,2% of 200 g wild fish = 44.4 g fish meal
- 22,2% of 30% per kg of farmed fish (harvest live weight)= 66.6 g fishmeal (supposed the by-products represent 30% of the harvest live weight and are recycled to fishmeal)
- 47.6 g (30% of the total of fish meal employed by the farm)

Thus up to 158.6 g fish meal per kg farmed fish (harvest live weight) would be tolerated even under the strict fair-fish approach. This satisfies about 50% to 75% of what is usually employed today. It should not be so difficult to drive the Salmon industry there, should it?

Similar calculation has to be made with fish oil of course.

5. **Any foresighted Salmon farmer** who claims to produce sustainable and to present an alternative to the depletion of fish stocks **should aim at phasing out his fishmeal and fish oil input** according to such calculation (and even to zero) before public pressure urges him to do so overnight.

Conclusion

We take the efforts made by FTAD participants for serious, and we are far from polemics about the results as the task is not so easy.

Nevertheless we feel that responsible Salmon farming should yield a good answer to the two questions discussed above. With the criteria presented in draft 2, ASC would just bring in more of the same. This is not the answer concerned consumers are expecting – and consequently it is not a standard concerned farmers could relay upon for long. When will they have to reinvest next time to cope with demand?

Thank you very much for taking our input into account.

Kind regards

STIFTUNG FÜR DAS TIER IM RECHT

Gieri Bolliger

Dr. iur. Gieri Bolliger
Geschäftsleiter und Rechtsanwalt

Dear Mrs Bostick, dear members of the FTAD steering committee,
In regard to your work to develop global standards for responsible salmon farming, we would like to express our strong support of the positions of fair-fish and Albert Schweitzer Foundation and would therefore like to join them in their call for the inclusion of several improvements regarding fish welfare and the reduction of wild forage fish used.

Sincerely,

Annette und Hartmut Bader

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Carlene Louise Petty
*Organization/Company: University of Louisville
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3	3.1.7	I applaud the no tolerance for transgenic salmon. The danger of altering species with foreign DNA is too great; actual shortterm and longterm impacts are unknown. However, allowing genetically-enhanced farmed salmon also scares me because again the ultimate impacts on the species remain unknown. I personally choose not to eat any "genetically-engineered" food whether plant or animal.	At the very least, if genetically-enhanced salmon are permitted, these should be so labeled in the marketplace. I would prefer no tolerance for genetically-engineered salmon. In that way there would be no danger of genetically-engineered salmon escaping and interbreeding with wild salmon and thus altering wild salmon populations.
	3.3	I believe option B regarding sea lice at critical times is the best solution because it recognizes local differences and adjusts for them. Aquatic environments are not global, so enforcing one global standard does not make sense.	

Principle 4			
Principle 5			
Principle 6			
Principle 7			
General comments		I found nearly all standards for grow-out remarkably fair and just and addressed all relevant issues.	

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3			
Principle 4			
Principle 5			
Principle 6			
Principle 7			
General comments		These seem reasonable and doable.	

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Per Gunnar Kvenseth
*Organization/Company: Villa Organic
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3	3.1.4 3.1.7 3.4.2	Difficult to handle = count sea lice at tem lower than 4C What about Chile – area with wild salmonids ? Is 300 the number per farm, per pen + per company ?	Weekly sealice counting at temperature higher than + 4C Must be spescified - difficult
Principle 4			
Principle 5	5.1.4 5.2.6	Counting methods for dead fish collected ? + or antiparasiticide treatment (prophylactic)	One (1) dead fish is recorded and counted as one (1) dead fish – no multiplying with 1,5 until 0,5 kg, 1,2 from 0,5 – 1,5 kg or ?? None

	5.3.1 5.3.2	… when one (1) application treatment have not produced the expected effect Specify immediate = within 2 weeks	Change 2 with one treatment with reduced effect to run bio- assay Harvest all fish within 2 weeks
Principle 6			
Principle 7			
General comments			

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3			
Principle 4			
Principle 5			
Principle 6			
Principle 7			
General comments			

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: August 3, 2010 to October 3, 2010

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT October 3, 2010.

*Name: Barbara Watson
*Organization/Company:
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1	1.1.1	It is ludicrous to establish protected conservation areas, then grandfather aquaculture feedlots to remain operating within them. The purpose of a conservation area is to eliminate ALL harm from human activities. See http://www.pac.dfo-mpo.gc.ca/fm-gp/rec/restricted-restreint/rca-acs-eng.htm The listed examples do not comply with federal land and water use regulations. It is also my contention that all of the existing water tenures were obtained by a process that did not adequately consult or notify the primary users of BC's waterways and are therefore null and void. (Official complaint to BC's Ombudsman is currently under investigation)	Remove the following aquaculture feedlots from Rockfish Conservation Areas. They do not comply with Federal regulations. Finfish • (Area 12) • Maff# 1350 Shelter Bay • Maff#1351 Marsh Bay • Maff#1198 Raynor • Maff#869 Maude • Maff#819 Cecil • Maff#143 Larsen • Maff#465 Swanson • Maff#1145 Potts Bay

			• Maff#467 Midsummer • Maff#141 Port Elizabeth • Maff# 1586 Doctor Islets • Maff# 1618 Humphrey Rock • Maff#1059 Sargeaunt Pass • (Area 13) • Maff# 1136 Shaw Point • Maff# 1300 Althorp • Maff# 1110 Poison Creek • Maff#1117 Jack Creek • Maff# 100 Lees Point • Maff#790 Chancellor • Maff# 769 Young Pass • Maff#733 Cyrus Rocks • Maff#137 Conville Bay • Maff#248 Conville Point • Maff# 547 Read Island • Maff#138 Dunsterville • Maff#216 Yellow Island • (Area 16) • Maff# 221 Vantage

			• Maff#746 Farm 13 • Maff#332 Salten • Maff#572 Newcombe • Maff#412 Site 9 • (Area 24) • Maff#520 Bedwell • Maff#1472 Westside • Maff#1291 MacIntyre Lake • Maff#1537 Bare Bluff • Maff#526 Rant Point • Maff#543 Mussel Rock • Maff#527 Saranac • Maff#753 Cormorant • (Area 27) • Maff# 1299 Thorpe Point Finfish Feedlots located within 1 mile radius of Rockfish Conservation Areas • (Area 12) • Maff# 1335 Wehlis Bay • Maff#706 Hardy Bay • Maff#466 Arrow Pass • (Area 13)

			• Maff#1581 Hardwicke Site B The shellfish map does not have Maff# information shown. Shellfish in feedlot quantities are also very harmful to fish habitat. Listed below are the Rockfish Conservation Areas that have been permitted commercial shellfish activities. The debris, hazards and unlit dangers of shellfish farms are a major problem for navigation and local residents. Shellfish • (Area 13) • Kanish Bay - Area 13-11 • Octopus Islands to Hoskyn Channel - Area 13-12 • Read island - Area 13-16 • (Area 15) • Teakerne Arm - Area 15-5 • Desolation Sound – Area 15-5 • Copeland Islands – Area 15-3 • (Area 16) • Hotham islands – Area 16-12 • Hardy Island – Area 16-11 • Sabine Channel- Jervis-Jedediah Islands- Area 16-1, 16-19, 16-21

			• (Area 17) • DeCourcey Island North – Area 17-17 • Gabriola Passage – Area 17-17 • Coffin Point – Area 17-5 • Thetis-Kuper Islands – Area 17-4, 17-5, 17-6 • Saltspring Island North – Area 17-2 • (Area 18) • Prevost Island North – Area 18-2 • Burgoyne Bay - Area 18-7 • (Area 24) • Saranac – Area 24-7 • (Area 27) • Holberg Inlet - Area 27-11
Principle 2			
Principle 3			
Principle 4			
Principle 5			
Principle 6			
Principle 7			

General comments			

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1			
Principle 2			
Principle 3			
Principle 4			
Principle 5			
Principle 6			
Principle 7			
General comments			

Wilderness Tourism Association
BRITISH COLUMBIA | CANADA
PO Box 423; Cumberland, BC; V0R 1S0; (250) 336-2862; www.wilderness-tourism.bc.ca

June 14, 2011

Steering Committee
Salmon Aquaculture Dialogue

Dear Steering Committee,

Re: SAD Standards

We are writing to provide our comments on the Salmon Aquaculture Dialogue and the proposed standards/criteria that will lead toward certification of the salmon aquaculture industry.

We would first like to acknowledge and congratulate the World Wildlife Fund and other stakeholder groups for having the foresight to pursue a standard for the aquaculture industry and an associated accreditation/certification system. It has been a great way to engage all stakeholders that have an interest in salmon aquaculture and encourage a constructive dialogue around the issues related to this industry. The SAD process itself has done a good job of covering the issues and addressing the concerns involved in each issue area. However, the WTA feels very strongly that the process still lacks the appropriate information and clarity to set certifiable standards. The evidence that the proposed SAD standards will protect our wild salmon from the impact of salmon farms is still not there and therefore we cannot support them. For this reason we also can not support the subsequent certification process as it currently exists.

Generally speaking, there is no certainty that adoption by farms of these standards will protect the wild salmon stock. In reference to Principle 3: Protect the health and genetic integrity of wild populations; in general there continues to be a lack of agreement and inconsistencies around the impact of salmon farms on the wild salmon stocks in British Columbia, and the management of this impact. For example, with respect to the standards related to sea lice levels on farm fish, the threshold(s) for lice that can be transmitted to wild fish without having a significant impact are not clear and not proven. Also, the standards related to threshold numbers of lice on farm fish before treatment, and the timing of treatment do not align with current farm practices in the Broughton Archipelago where lice levels appear to have been reduced through such measures. For example, lice treatment is often done months before the out migration of salmon smolts. The farm lice thresholds for treatment also relate only to Lepeophtheirus salmonis and say nothing about Caligus impacts on health of wild salmon. The science around the impacts of Caligus is still not understood but precautionary measures need to be in place.

Regarding transparency, the standards appear to require the salmon farms to only make some performance data publicly available and other performance data available to the ASC1. It should be acknowledged that to date both government and the salmon farm industry have been complicit in various forms of obfuscation and the sampling results of wild fish around the farms by the DFO and Industry has generally not been made available to the public. Only thru the Cohen Commission has

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information on the impacts from lice and other parasites and diseases been made available to those who have standing, however it is not available to the public. In many areas there is no sampling of the wild salmon impacted by farms

Certification will lead the general public to believe that salmon farms are meeting sustainable standards, and thereby minimizing farm impacts on wild salmon and other integral parts of the marine ecosystem. As currently proposed, the SAD standards have not been able to demonstrate that this is true. As noted, there are also many areas where standards and/or thresholds have yet to be determined and the SAD is looking for further input. The thresholds need to be set low enough so that corrective action can be taken before the full impact of farm's sea lice is born by the wild salmon out migration and their destruction takes place. We also need to see processes in place to deal with those salmon farms that have been certified, but are not following through on meeting the standards. For example, what penalties will be levied for non-compliance? These processes or requirements have to be clear, transparent, and easy to enact. Our position therefore is that while the current draft standards are a significant step forward, they are not worthy of certification. We fear that unless the accreditation/certification has some kind of graduated system built in the process will be hard to control. We need to get it right the first time.

The farm industry should try over the next couple of years to use the standards as a guide or industry best practice. At the same time, the regulatory agencies and researchers need to come to agreement over impact of salmon farms on wild stocks. We need to see adequate sampling programs of wild salmon for sea lice and other parasites and diseases set up and funded so stakeholders can agree on the impact of sea lice transmitted to wild salmon, and ensure that this impact is not harmful to wild salmon before certification can be granted. The carrying out of measurements and preparation of data on wild salmon escapements per year for all major spawning areas needs to be made available to the public and in a more timely fashion. Sampling of farm salmon stock and wild salmon stock also needs to be carried out on a regular and timely basis and reported transparently on a farm by farm basis.

We suggest a time line of several years (5 years or more) working with the proposed standards and improving on the research to actually determine if the standards will protect the wild salmon stocks before giving consideration to certification. This time period will also allow stakeholders to evaluate the new closed containment farm technologies that are taking shape and the impact that they are having or not having on the wild salmon.

Regards,

Brian Gunn
President
BC Wilderness Tourism Association

Comment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14, 2011.

*Name: Sabra Woodworth
*Organization/Company: Retired Secondary Teacher
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1 **COMPLY WITH ALL APPLICABLE NATIONAL LAWS AND LOCAL REGULATIONS**	1.1.1 – 1.1.5	Compliance with *existing* laws fails to address many issues, such as the need for routine government pathogen monitoring & testing (IHN ISA etc) on all farms on a weekly basis. Relying on (a) industry to monitor itself, and (b) incomplete disease reporting due to confidentiality agreements leaves very much to be desired. Canada is a member of the World Organization for Animal Health which stipulates that ISA is a reportable disease, but in BC we do not routinely test for this pathogen. If we don't test for it, the records are free of it, & so BC is said to be free of ISA.	We function on the principle that what we don't know can't hurt us. No abiding by an infinite number of regulations renders Principle # 1 a viable principle if you neglect to take into account WHAT THERE ARE NO LAWS and/or OVERSIGHT FOR. Solution: we need to be working on LAWS, not only standards.
Principle 2 **CONSERVE NATURAL HABITAT, LOCAL BIODIVERSITY AND**	2.1.1 – 2.1.4	So many good principles, requirements, even laws are on the books & look splendid on paper, but reality out in the field with	Letting the salmon aquaculture industry monitor itself is much the same as letting the police investigate themselves: finally we are

ECOSYSTEM FUNCTION		insufficient funding or will for implementation renders "the good work" stashed away on office shelves largely window-dressin . At present, BC has requirements about what is discharged into national public waters, but virtually no one dives down to study what is coming out of the discharge hoses. Occasionally when an inquisitive soul checks up on those discharge pipes/large hoses, as one film-maker did, the lice, blood, & fish pieces violated all "regulations".	getting around to realizing what a mistake that has been, & we're changing it. Solution: until there is regular public CFIA monitoring on all farms at all times, all the paperwork in the world is not going to ensure that "an environmental quality status" is achieved for having supposedly met elaborately written STANDARDS. Only on-the-ground monitoring will deliver results.
	2.2.1 – 2.2.3 2.4.1.- 2.4.2	Water quality is about more than DO. If water cannot be tested for all manner of effluent & disease, what good are the tests? If it is well recognized that we are harming our oceans (*Sea Sick* among other books), when will we decide NOT TO PUMP 1000's of tons of Slice (among many other chemicals) into our waterways? Our infinite serving of industry leads to an infinite amount of pollutants in all environments on a finite planet.	Solution: move all salmon feedlots onto land and the need to spend 100's of 1000's of dollars studying impacts will not be necessary. All wild salmon migration routes need to be considered CRITICAL HABITAT: apply the precautionary principle so we don't risk infecting baby smolt with either lice or pathogens (known, or yet to be discovered). The WWF needs to return to its original vision of humanity NOT HARMING THE PLANTET, for profit or any other reason.
Principle 3 **PROTECT THE HEALTH AND GENETIC INTEGRITY OF WILD POPULATIONS**	3.1.1 – 3.1.4	This language is getting closer to what is needed, but again, **oversight** for all these fine intentions is completely lacking. Who's to be out there testing for the most recently discovered pathogen by Kristi Miller? No one. Are you aware that up to 90% of sockeye have been suffering from "pre-spawn mortality" for unknown causes? This is true in a country that already says it subscribes to most of these GOOD INTENTIONS.	Solution: the precautionary principle is the ONLY standard to protect wild populations: all salmon aquaculture needs to be land-based. The history of salmon aquaculture is strewn with every imaginable problem followed by a make-shift remedy that has not been a solution at all. The ONLY motivation to continue this unconscionable industry is BIG MONEY. If there were no profits, no one would salmon farm. People will farm vegetables forever, to eat, not for profit. Humans can continue to fish for wild fish to eat, not *farm* a predator.
	3. 3	How do you know that transgenic salmon	Only the precautionary principle can lead us to

	3.4	have not already been tried out? Who is going to police this? Here we are at escapes, & we're only on #3! Problem after problem after problem after problem! That's what salmon aquaculture IS! A slew of never-ending problems.	do what is best. There will always be escapes. Just try to control that! No one is policing the reporting of them now. Is the WWF going to be there to follow up on these intentions? Are you there to see?
Principle 4 **USE RESOURCES IN AN ENVIRONMENTALLY EFFICIENT AND RESPONSIBLE MANNER**		The salmon producer and the feed supplier are, in one major case, the same company. Of course they work together. What *standard* can correct the problems inherent in this practice? Perhaps you can control the feed. This will have to be done for land-based aquaculture in any case, which truly isn't sustainable either. Domestic fisheries around the world are being decimated to serve up this most unnatural fish for rich middle-class customers. We are not feeding the poor or doing anything at all to help the world.	Solution: humans stop taxing the environment, learn how to live simply, change from a throw-away society to a society appreciative of the resources we have been laying waste to for a century = solutions we will not imagine. Change our belief in the essential materialistic meaningfulness of life. Getting and acquiring are a virtual religion. Is it truly the meaning of life? Is that why we are alive? To consume? Solutions for a healthy planet for the next 1000 years? Not the way we're going, not the way WWF is taking us.
Principle 5 **MANAGE DISEASE AND PARASITES IN AN ENVIRONMENTALLY RESPONSIBLE MANNER**	5.1.1.- 5.1.7	The March 1st, 2010 Information & Privacy Order F10-06 cites the attitudes of the 4 biggest companies in BC: when required to produce their disease information, they each stated clearly, as recorded in this document, at if their disease information was to be made public, they would cease to produce it: "[95] Mainstream flatly submits that it will not supply similar information when it is in the public interest that similar information continues to be supplied." "Marine Harvest submits there are 'no regulations or laws' which require it	Standards are not enough: enforcement is needed, & that is not what this SUSTAINABLE CERTIFICATION is offering. The WWF has gone about this exercise of devising well-intentioned standards on the basis of agreeable compliant companies: nothing could be further from the truth. Would you do the same to get agreement from hardened criminals? Ask them to abide by nice-sounding "standards"? If it means they get out of jail free, of course they'll be nice

		to release the information it gives to Ministry veterinarians or designates during on-site visits. It states that release of the requested information would result in Mainstream no longer supplying the requested information.”	and agree. Standards have no teeth.
	5.1.2 **5.2 Therapeutic treatments**	- It’s all very well to have site veterinarians: they don’t report ISA when it’s not part of the regulations to do so. So much slips by these fine-sounding regulations. - More of the same… Slice goes into the feed and into the waters. Just because we “ALLOW” all kinds of poisonous chemicals does not make it *right*. So “primary producing countries” allow poison? These standards would make might right. That’s us.	“Accurate and detailed documentation…” endless reams of documentation can never **BE** (or even SUBSTITUTE FOR) right practice. Right practice and integrity cannot be legislated, nor standard-ized. We’re barking up the wrong tree. Folly is an endless maze, Tangled roots perplex her ways. How many have fallen there! They stumble all night over bones of the dead, And feel they know not what but care, And wish to lead others, when they should be led. William Blake
Principle 6 **DEVELOP AND OPERATE FARMS IN A SOCIALLY RESPONSIBLE MANNER**	all	If the ILO cannot bring these ideal practices into existence, how will standards set by some aquaculture interests be able to do so? Congratulations on a great effort… if wishes were horses… what these companies want is a green light from a big environmental voice like yours!!!!! It means billions & billions. I used to send money every month to WWF… two decades ago: I’m rather happy that my donations came to an end when I changed residences, for I’m appalled at what WWF is doing.	The solution: have the countries of the world give the UN some real clout & enforcement capability, and make these standards international laws with TEETH. Nothing less will do it. Good that you’re planting the seeds of ideas… but none of this will alter the Canadian Government’s marriage with the aquaculture companies. They’ve got it all sewn up tight to do exactly as they please… & you’re trying to give them the environmental stamp of approval. Shame.

Principle 7 **Community Engagement**	Evidence of regular and meaningful consultation and engagement with community representatives and organizations	Hmmmm … world changing standards!!! If I had a magic wand… one touch on the shoulder of a student would give them a complete understanding of English. If these standards can manifest "MEANINGFUL CONSULTATION AND ENGAGEMENT WITH COMMUNITY, REPRESENTATIVES AND ORGANIZATIONS"…. WWF can govern the world.	This is the solution! Grass-roots public participation in all aspects of government and how countries are to develop. Unfortunately, "sustainable standards" are not a magic wand that can manifest what they describe. To say an activity is sustainable does not make it sustainable, though the public does like to believe that good organizations like WWF act in good faith. Sad.
Compliance with local and national regulations on water use and discharge, specifically providing permits related to water quality		Canada allows the companies getting oil from the tarsands unlimited and exorbitant use of vast amounts of water at NO CHARGE. How are a set of "standards" from anyone anywhere going to cause them to question doing exactly what they please in any corporate venture? There are no "national regulations" for such unprecedented needs.	Solution: an informed citizenry, a media that exists to educate and inform (not sell sell sell), a vision of a viable sustainable future based on renewable resources, including renewable oceans, NOT DEVASTATED OCEANS, a WWF that will ensure that tons and tons of Slice DO NOT enter the environment… an ethical revolution.
General comments			

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION

Principle	Criteria/Indicator /Standard (e.g., 2.1.2)	Comment(s)	Proposed solution or amendment
Principle 1			
Principle 2			
Principle 3			
Principle 4			

Principle 5			
Principle 6			
Principle 7			
General comments			

eComment form for Draft Salmon Aquaculture Dialogue Standards

Public Comment Period 2: May 16, 2011 to June 14, 2011

Email the completed comment form to salmonaquaculture@wwfus.org by 11:59 p.m. EDT June 14 2011.

*Name: Jose Villalon, Piers Hart, Karoline Andaur, Deb Trefts, Georg Scattolin, Mariann Breu, Heike Vesper, Ricardo Bosshard
*Organization/Company: WWF Network Offices (US, UK, Norway, Canada, Austria, Germany, Switzerland, Chile)
*E-mail address:

Note: Information with an asterisk is required, as all comments will be posted with attribution (commenter's name and organization/company) on the salmon Dialogue website. This is in line with the Dialogue's policy of being transparent. The commenter's e-mail address will not be posted but is required in case we need to contact you for clarification on a comment.

COMMENTS ON STANDARDS FOR GROW-OUT

Principle	**Criteria/Indicator /Standard (e.g., 2.1.2)**	**Comment(s)**	**Proposed solution or amendment**
Principle 1	General for P1	WWF is pleased with the changes that have been made to standards under Principle 1, in particular we support the edits made to 1.1.5 to focus and clarify the standard. Minor edits are needed to ensure the standards in Principle 1are consistently written.	-Principles 1.1.2 and 1.1.4 should be revised to state 'local and national' compliance.
Principle 2	2.1	• Agree with the inclusion of standards related to both chemical and faunal measurements of benthic health. The combination of the two measurements are needed to understand and ensure the benthic health around farms. We also agree that allowing options (i.e., either redox or sulphide, and one of four faunal benthic indices) addresses the challenge of ensuring that a global standard is regionally relevant. • Support the revisions made related to	

		site-specific AZE. As a SC member, WWF is committed to helping define credible modeling and verification systems and we agree that the SEPA AUTODEPOMOD modeling scheme should be considered as a model for how AZEs are further defined.	
	2.2	WWF wants to ensure that the level of this standard is appropriate for ecological health and fish health (due to link of water quality to health of salmon and required treatments, disease transfer, etc). From an environmental and fish health perspective, it is not clear that it is better to use a percent saturation rather than straight dissolved oxygen level under the standard. Regardless of which is used, WWF supports strengthening this standard. Back-of-the-envelope calculations tell us that at 60% saturation, in seawater with salinity of 30 ppt, DO falls below 5 mg/l at temperatures higher than 15 degree C. DO at or below 5 mg/l is not what we would consider to be ecologically good. A stronger standard here will promote both better environmental health and better farmed fish health. We also support edits to the standard that take into account natural fluctuations in DO in the environment (fluctuations that are unrelated to salmon farming), since the purpose of the standard is to minimize impact from the farm.	Refine the methodology for measuring 2.2.1 with information related to depth, time of day and position in relation to the cage of oxygen readings. Consult additional water quality experts to determine whether 70% or 80% is an appropriate level for the standard globally, and the best way to structure the standard to allow for periodic exceptions to this. One option to consider would be to have more than 90% of the samples taken over the course of a year be above 80% saturation. This would allow for some weeks of lower DO. Another option would be to require comparison to and consistency with a reference site if the DO drops to a certain point—this would be used to demonstrate that the DO level is related to natural phenomena and not the farm.
	2.2.2		Consult additional water quality experts and consider raising the 1.85 mg/l to be higher as one expert suggested that less than 2 mg/l can lead to death in many fish species.
	2.4.1	This standard will benefit from being re-written to be more straightforward.	A complete re-write of the same points in clearer form may be best. I particularly, in

			part "c" of this standard, it must be clear that implementation of strategies and programs is required.
	2.5.4	"Senior manager" needs to be defined	Recommend that the national CEO be required to be involved in the approval for lethal action, or a "after-the-fact" recognition by the CEO be required.
Principle 3	general	WWF wants to see a clearer linkage between the on-farm lice levels and the ABM lice level. Additionally, there should be more direct guidance on how an ABM should take into account results of wild monitoring. We recognize that this is a bit of a gray area and a challenge for auditing, but would not like to see an ABM disregard the findings from monitoring and still be certified.	
	3.1	The proposed on-farm lice levels are a significant improvement over regulation in some places, but not in others. Based on scientific evidence that we have seen, it appears that the proposed lice level should be sufficient to protect the health of wild salmon in most places, but only if the industry does not expand. In other places, reduced concentration of the industry, or even lower levels of lice, may be needed (WWF Norway will provide a reference for a new report on this). Implications of this level for coastal sea trout are less clear. Because the concentration of production in an area plays a large role in determining what level of on-farm lice is needed to protect wild salmonids, we are concerned that there isn't a clear linkage between the ABM total lice level and the on-farm lice	•

		level in the standards. This needs to be made more explicit. During the final revisions of the standards, it is important to review requirements related to areas both with and without native wild salmonids. The absence of wild salmonids in an area does not necessarily mean that wild fish in the region cannot be negatively impacted by interactions of disease and parasites between farmed and wild fish. It is of critical importance to WWF that standards related to sea lice and disease for Chile are not lax due to the lack of wild salmonids, as species such as robalo may be impacted.	
	3.1.2	WWF strongly supports the collaboration of companies that have certified farms with the scientific community, NGOs, and government as a way to build a better understanding of interactions and impacts.	• Suggest broadening out the concept of collaboration to incorporate issues beyond effects on wild fish populations.
	3.1.7	Between the choices of Option A and Option B, WWF sees real challenges with the timing of the feedback loop and the ability to set appropriate wild lice thresholds in Option B. Simultaneously, we like the idea of the on-farm lice level being linked to conditions in the wild. Unfortunately, at this time we do not see Option B as a workable option.	•
	3.2	• A clear definition is still needed for auditing guidelines with relation to "widely commercially produced in the area". • There are some concerns that this standard may encourage a rush to	• The SC should agree upon a list of countries and species to define what species-country pairings qualify as "widely commercially produced in the area". • Change "by the standards release date" to "before 2010"

		establish production of non-native species in places where they are not yet farmed. For this reason, the standard should be back-dated.	
	3.3		• For clarification purposes, edit indicator to read "production or use of transgenic…". • Fix the numbering: it should be 3.3.1
	3.4	Some concerns that the pre-smolt vaccination count is not as accurate as initially thought during discussions.	• Delete footnote related to presmolt vaccination being the preferred count. • Ensure that in the auditing guidance it is clear that whichever count is used, the counting technology has to have the required degree of accuracy.
Principle 4			
	4.1 to 4.4 (general comments related to feed standards)	Overall, WWF supports the changes that have been made to the standards related to feed inputs and traceability. It is important for both sourcing and efficiency of use of feeds to be addressed through the standards, and for the standards to encourage the continued reduction in use of wild forage fish resources per unit of salmon produced through the inclusion of FFDR. We would not support any edits that take away from these goals.	
	4.1		-Under 4.1, traceability to the level of country of origin should only be required for ingredients constituting more than 1% of the formulation. Tracking trace elements of feed seems an unnecessary burden with little to no environmental benefit.
	4.3.2 (and 4.3.1)	--WWF supports setting the standard related to FishSource score at the level in the draft standards. This level cuts out the worst fisheries and ensures a minimum health of	

		the fisheries. It does not, however, ensure that the fisheries are fully sustainable from an ecosystem-based management perspective that takes into account the particular ecological role of forage fisheries. --Therefore, we also support the longer-term requirement for MSC (or a credible, ISEAL afffiliated equivalent) certification as it is a more stringent standard for responsible fisheries.	
	4.7	The SAD standard should encourage the use of alternatives to copper-based antifoulants. As currently written, we believe the standard does so, however, data on the use of copper and on copper levels in sediments should be reviewed when the standards are updated to ensure that potential impacts from copper are being minimized.	
	4.3.4	We would like to encourage the use of by-products and trimmings from human consumption fisheries in feed. We recognize that due to timing of updates of the IUCN red list for fish species and because of the breadth of those listings, there may be some species listed as “vulnerable” where the status of the fishery has improved and the fishery should no longer be on the red list. Because of this, we recommend allowing for the use of trimmings and byproducts from any MSC certified fishery, even if it is listed as vulnerable by the IUCN.	Allow exceptions for any species that is listed as “vulnerable” for any particular fishery that is MSC certified.
	4.3.3	We recognize that the IFFO standard is currently in the process of becoming compliant with ISO 65. If that process is not completed prior to the publication of the SAD standard, we would support allowing use of the IFFO system to comply with 4.3.3	

		as long as they are undergoing ISO.	
	4.4.3	All of the WWF Network offices contributing to these comments support standard 4.4.3, since we feel that at a minimum it is important for buyers/retailers to be informed about whether transgenic ingredients are used in the feed or not. From a market perspective, it is important that this information is available to the buyer. Additionally, some WWF offices (Germany, Switzerland, and Austria), believe this information should be available to consumers. Retailers in Germany, Switzerland and Austria strongly demand GMO free products and WWF members in these countries have concerns with the use of transgenic ingredients in animal feeds.	
Principle 5			
	5.2.5	• We strongly support the inclusion of a threshold for parasiticide usage in the standard. We see the benefits and challenges with using an index rather than setting an exact number of treatments. If it is possible to locate consistent LC50 and persistence data for the short list of parasiticides used in salmon culture, we support the idea of using an index that incorporates toxicity, persistence, and kg of active ingredient of parasiticide. • Though we see the benefits of an index rather than setting a specific global threshold or number of treatments permissible, without consistent LC50 indicator species data for each of the different parasiticide, an index will be	

		very challenging. • The threshold set under the standard at this time seems very high based on data available about current parasiticide usage. We support reducing this number immediately, and building in a further reduction in use over time.	
	5.2.7, 5.2.8	We support standards 5.2.7 and 5.2.8 as written: prohibiting the use of antibiotics that are critically important for human health at operations certified against the SAD standard; and, requiring risk assessment for use of antibiotics listed as highly important by the WHO. We recommend evaluating whether adding a standard related to application method may be relevant to reducing the risk of use of highly important antibiotics.	
	5.2 (new standard)	We are aware that increasingly, techniques for bath treatments are being used that are more "closed" (such as a full skirt with a bottom or treating in well-boats). This has been demonstrated to increase efficacy of treatment for some parasiticides, and it is environmentally preferable as it allows for the parasiticide to break down and lose some of its toxicity prior to release into the environment. Additionally, for treatments in well-boats, the treated water can be moved and disposed of in areas with lower risk of negative impact.	-Add a standard requiring that sea lice treatments either be in-feed, or a closed bath treatment (and consider exempting H_2O_2 treatments from this requirement)
Principle 6		WWF agrees with the changes/revisions made to Principle 6	
Principle 7		WWF agrees with the changes/revisions	

		made to Principle 7. Additionally, a strengthened mention of the goal of achieving free, prior, and informed consent of communities, and in particular of indigenous communities where farms overlap with indigenous territories, would strengthen the standard.	
General comments		Strongly support the transparency and sharing of data from certified farms.	
		WWF believes that there is a role for certification and voluntary standards to transform industries and markets to achieve environmental gains. In order to effectively conserve marine biodiversity, certification is a tool that must be complemented by regulations, coastal zone planning, and the integration of marine protected areas and no-go zones for aquaculture or other development into coastal regions. WWF supports the direction in which the standards are headed. We are pleased with progress made since the last draft and look forward to the finalization of the standard. When considering the full suite of the standards (the entire document), these standard are shaping up to be significantly more environmentally and socially rigorous than any other voluntary standard on the market. While they will not be perfect, we believe that with final revisions, the standards will lead to significant environmental gains compared to current global performance. On some key issues where time is a necessary element for change, integrating	

		immediate requirements that then become more stringent after a few years will lead to initial changes and immediate reduction of impacts, followed by further environmental gains in a few years time. This is an important element for ensuring that the standards are an effective mechanism for effecting real change rather than developing a hypothetical "perfect" standard that is virtually ignored and therefore will not have any impact. We note that the first few years of certifications are important to gather information to improve the standard when it is first revised. We support the continuous improvement of the standards over time, adapting them to take into account the best available scientific knowledge about impacts and interactions. We hope that the data collected and made available contributes to that scientific knowledge.	

COMMENTS ON STANDARDS FOR SMOLT PRODUCTION (SECTION 8 of document)

Indicator/Standard (e.g., 8.4 or 8.22)	**Comment(s)**	**Proposed solution or amendment**
8.25	WWF believes it appropriate to move to closed smolt production systems in Chile as quickly as possible given the findings of our research on impacts of open smolt production. Additionally, due to ISA, many producers have been moving away from lake production and some would immediately be able to meet this standard for a	Reduce the timeframe from 5 years to 3 years.

	portion of their operations.	
General comments on smolt standards	WWF strongly supports transition of salmon smolt production out of open systems to recirculating systems due to the significant reduction in risks related to escapees, disease exchange, nutrient loading, and release of therapeutants into the environment.	