

## **Compiled comments on draft indicators for environmentally, socially and economically responsible salmon farming, November 2 – December 15 2009**

The Salmon Aquaculture Dialogue Steering Committee (SC) released draft indicators for environmentally, socially and economically responsible salmon farming on November 2, 2009. The indicators were posted on the website and open for public comment through December 15 2009. The comments below were received during the six-week public comment period. The SC would like to thank all of the individuals and organizations that took the time to provide feedback on the draft indicators.

The comments will be reviewed and considered by the SC as they revise draft indicators and develop draft standards. In revising indicators and drafting standards, the SC will consider the complete body of comments that they received via the website, feedback collected at the open salmon Dialogue meeting held on November 17-18 2009, advice solicited from technical experts, and comments provided directly to them as SC members. The SC hopes to release draft standards for comment in April 2010.

More information on the Dialogue, the draft indicators, and the November meeting is available at [www.worldwildlife.org/salmondialogue](http://www.worldwildlife.org/salmondialogue).

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18 June 2009

Aldin Hilbrands, Royal Ahold

This assessment is based on the “Draft Tilapia AD Standards (Period 2 – 26 May 2009) and “Salmon AD Draft Principles and Criteria (13 February 2009)”.

### **Comments on Salmon Standards**

- There is a requirement to comply local and national legal frameworks, but no explicit mention to comply with national labor legislation and relevant legislation on occupational health & safety.
- No requirements on the maintenance of labor documentation.
- No requirements on the implementation of a social policy in line with the conditions of the standards and no requirements on appointing responsible persons within management to implement such a policy.
- No indicators available (only principles and criteria)
- Criteria are similar to Tilapia, but missing are:
  - Community access
  - Working hours
  - Living conditions
- See comments on Tilapia.

### **Comments on Tilapia Standards**

- Requirement to comply with national labor legislation and relevant legislation on occupational health & safety, as well as requirements on the maintenance of labor documentation, are captured in principle 1.

- No requirements on the implementation of a social policy in line with the conditions of the standards and no requirements on appointing responsible persons within management to implement such a policy.
- No indicators on working conditions for young workers (under 18), nor educational requirements and opportunities.
- No indicators on harassment and abuse.
- Limited indicators on health and safety.

### Comments on Methodological Issues

- The social principle in each of the AD standards is differently defined. In some cases it includes community engagement, in others it does not. Some criteria can be found in all social principles, others are not. As a result, it must be concluded that the social aspects of the AD standards are not consistent in content and approach.
- The Core ILO Conventions and compliance with legal requirements should be the basis for any standard concerning social compliance. These are not currently covered by all AD standards; particularly the Shrimp AD standards miss some of these requirements.
- It is unclear from the documentation how and by whom the social aspects of the AD standards will be audited, monitored and evaluated. A prerequisite for consistent and qualitative social auditing is that the auditors must have in-depth knowledge of local, national and international labor legislation (including health and safety issues), skills in assessing labor documentation and permits, and extensive experience in social auditing.
- Auditing community relations is even more delicate than auditing labor issues on-site, and requires a clear methodology on how to reach an objective assessment of community relations.
- If the purpose of the Aquaculture Dialogue Standards is to use those standards to certify farms against one final consumer label (regardless of the species), it is worth considering the “message” communicated by such a label. For a retail company, it is essential that a label conveys a trust-worthy message to consumers that is – above all – consistent and reliable. Certifying different species under one label against substantially different criteria will lead to confusion in the industry and among consumers (and consumer groups).
- Recognition of existing social audit schemes through benchmarking could be a viable alternative to creating own standards. Social requirements, just like food safety requirements, could be considered a pre-requisite that is to be covered through existing social audit schemes. A benchmark for acceptable food safety and audit schemes has been developed by the GFSI (Global Food Safety Initiative) and the GSCP (Global Social Compliance Program) respectively (see [www.ciesnet.com](http://www.ciesnet.com)).

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Date: Nov 4, 2009 5:32:08 AM

John Ace-Hopkins, MD Ace Aquatec Ltd

Comment(s):

Criterion 2.5. The use of ADDs should ideally be measured as the number of noises per day/week/year. The US2 has this facility. Our US2 is designed for deployment 356 days per year but it does not mean that the environment is polluted by sound. Other manufacturers do not have this facility so the number of days sounding plus the setting would be required to give you the same result. I disagree with your Notes. The frequent use of ADDs could indicate good fish husbandry or a persistent seal that the farmer is not choosing to shoot. I would however suggest that you include a measure that logs the abundance

of marine mammals around a farm. If marine mammals continue to be present then it indicates a good relationship between farm and environment.

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4 November, 2009

Sandra Marín, Instituto de Acuicultura, Universidad Austral de Chile, Puerto Montt

In this document I want to expose what we have found regarding the Principle 2 to contribute to the discussion, since we have been using some of the indicators discussed for the principle 2.

Principle 2: conserve natural habitat, local biodiversity and ecosystem function

2.1. Benthic biodiversity and benthic effects

2.1.1. Chemical indicator: Redox potential and /or Sulphide levels in sediments.

I believe redox potential estimates have also problems, since procedure for estimating this indicator is not always accomplished, there are several errors associated to its measurement. I suggest both indicators are needed or be sure that procedures are being correctly applied. In our analysis we have found that these 2 indicators always show difference between control and affected sites.

2.1.2. Faunal Indicator: AZTI Marine Biotic Index (AMBI) in sediment: Our work group has used the AMBI index to characterize benthic community in 6 farms located in the Los Lagos Region using affected sites (under the salmon cage) and control sites (1 km away from the salmon cage). We have found that the AMBI index provide much more useful information than the common index of diversity and community richness. In fact both diversity and richness were lower in affected sites compared to control sites, but they did not show changes through the salmon growing phase as it did the AMBI Index. In fact, in some farmed AMBI showed a continuous increase along the productive cycle, suggesting that the effect is accumulating. In other farms this pattern was not clear and although it may be related to productive characteristics of the farm it may also indicate that there sites in which the impact may not be that severe. This would allow us to study what sites would be more suitable for aquaculture. We also found that this Index associated to its corresponding classification regarding benthic community health and site disturbance allows us to know how the benthic community moves through the different stages from the beginning to the end of the productive cycle. We have also found that (i) control sites may not be always control sites regarding AMBI Index and ecological group of species and (ii) farms begins a productive cycle on the sea in sites that are already affected, suggesting that there was no enough time for the site to recover from the previous productive cycle.

Given what we have found I believe this index has the advantage that in 1 graph or table provides much information. Usually to get this information you should estimate several indicators.

This indicator is useful not only for salmon farming but for several other activities that impact marine systems and using it will allows us to compare the impact of these different activities on a common base.

It has the disadvantage that it required a detailed analysis of the benthic species, but I believe that it has been already done for USA and Europe and for Chile we have made some progress. Still it is necessary to check species list but once it done it would be no problem. In the future this type of analysis may be done for labs and people need to be trained.

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November 4, 2009

Jon Gibb, Clerk to the Lochaber District Salmon Fishery Board

I am writing to you in my capacity as Clerk to the Lochaber District Salmon Fishery Board representing 60 different wild salmonid fisheries here on the West Coast of Scotland in the heartland of the Scottish salmon aquaculture zone. I am also the Fishery Manager on one of the largest salmon rivers on the Scottish West Coast – the River Lochy - one of many rivers that has been devastated by aquaculture in this region. I am, if you like, very much at the ‘coalface’ of the aquaculture/wild fish problem here in Scotland.

I have had sight of the WWF draft indicators for your proposed accreditation scheme for aquaculture companies.

My understanding is that WWF would award this accreditation to companies that can demonstrate environmental sustainability.

I am sorry to say that the indicators give me no encouragement whatsoever. Worse though, it is easy to see how their vagueness could easily see some of the worst offending aquaculture companies managing to fudge their way into this scheme. We have seen this already in the UK with the fish farmers’ self-written Scottish Code of Good Practice, a dreadful document that allows all forms of environmental damage to continue in spite of the companies ticking their own boxes.

**Until such time as all salmon farms are moved completely away from the seawater migration routes and freshwater habitat of wild salmon and sea trout, salmon farming on the West Coast of Scotland will remain environmentally unsustainable.** We have now had the best part of 20 years of scientific research and experience to know this is categorically the case. I am sure many of your members will be fully aware of the plethora of international evidence to support this. Salmon farms have proved incapable of containing their fish and incapable of controlling their sea lice in heavily farmed estuaries. No amount of wishful thinking, new codes, new aspirations etc etc is going to change that. They need to move, either to deepwater offshore or land-based sites.

Any accreditation scheme by the WWF, one of the world’s largest and highly respected environmental organisations, that does not have a basic and fundamental requirement for this accreditation as relocation away from the seawater migration routes and freshwater habitats of salmonids is surely unthinkable. It would surely also do the reputation of the WWF untold damage.

Much as I would like to be present myself in Bergen to present to the meeting these strongly held views borne out of many years of experience of this problem (indeed also the views of the 14,000 Scottish members of the public that have signed the recent petition to relocate salmon farms away from salmon rivers), please can I request that that these views are expressed in your deliberations and the WWF continues to fight hard against the desperate plight of wild salmon and sea trout wherever caged

salmon aquaculture is found in the world. The last thing we need is another false badge of green credentials for the Scottish aquaculture industry. A genuine reward for genuine environmental sustainability would however be a very progressive step forward and I wish you all the best with your work towards that.

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Date: Nov 7, 2009 6:20:48 PM

Henry Clifford, Aqua Bounty Technologies

Comment(s):

Indicator 3.3.1 should be modified and expanded to read:

3.3.1. Growing transgenic salmon should be allowed only if they can be assessed to pose an acceptable level of risk to the environment or consumer.

3.3.2. Only sterile, single sex populations of transgenic salmon should be permitted for growout.

3.3.3 Growing transgenic salmon in marine net pen enclosures or cages should be prohibited.

The same philosophy in crafting indicators for non-native species or chemotherapeutics should be applied to transgenic salmon, which is: transgenic salmon should be permitted if they are deployed responsibly in a way that does not adversely impact the environment or consumer.

To propose a blanket ban on transgenic salmon is both irresponsible and scientifically indefensible. Is the WWF suggesting that if someone wished to grow transgenic salmon in a closed, recirculating system 500 km from the nearest ocean or body water, it should be prohibited? Similarly, if someone wished to grow sterile, single sex transgenic salmon in a closed system with physical containment measures, how could the WWF justify prohibiting that?

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November 11, 2009

Fiona Cameron, Sea Trout Group

I have to say that I'm disappointed over the lack of any presumption against open net pen farming of smolts in salmonid watercourses. As you know, I have raised this point very forcefully at both of the SAD meetings I have attended. I had understood, from recent conversations with people close to the Steering Group, that this point had been taken on board. I am therefore rather at a loss to know what else the wild fish lobby in Europe can do to convince the Steering Committee that this is a relevant and very significant point. When people make the effort to attend meetings, raise points within those meetings at every possible opportunity, and yet STILL see them ignored, it's discouraging, to say the least.

I could say almost the same over again with regard to the omission of any references to sea trout. Our sea trout are, in many ways, even more significant than our wild salmon, in areas where salmon are being commercially farmed, and in other areas where there is pollution of coastal waters. Since sea trout do not migrate, but tend to remain within inshore waters during the whole of their cycle of marine

residence, they are a superb barometer of environmental status - the 'canaries of the sea', as people like to say here. But because of their tendency to remain in coastal waters, they are even more exposed to damage from over-amplified numbers of sea lice in those waters, and other aspects of pollution emanating from fish farms. In addition to this, very sound science which is now starting to come through in the UK, is confirming what we have all know for a long time: the presence of smolt cages in freshwater systems which contain salmonids can have deleterious effects on the tendency of resident brown trout to become sea trout and migrate - so the very existence of potential generations of sea trout may be threatened in such circumstances.

The failure to address the issues relating to both sea trout and freshwater pens means that the wild fish interests I represent can see little in the latest Draft Criteria to convince us that the process can deliver anything approaching sustainable salmon farming, unless and until points such as those - and the other issues raised by wild salmonid interests here - are taken on board.

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November 13, 2009

Salmon & Trout Association, Association of Salmon Fishery Boards, Rivers and Fisheries Trusts of Scotland

Response to Draft Indicators for environmentally, socially and economically responsible salmon farming

#### General Comments

This is a disappointing and ultimately frustrating draft. It seeks only to set standards over existing practice, rather than demand action which would develop the aquaculture industrial towards environmental sustainability. It would pass as the industry's internal standards document, merely proposing monitoring protocols for analyzing sediment and water quality, and for half heartedly addressing parasite and disease transfer and location issues. However, there is a feeling of déjà vu to the content, and the fact that we have moved little further forward over the past two decades. It threatens to standardise flawed operating procedures, rather than tackling the deep rooted problems associated with salmon aquaculture.

This response is made on behalf of the Salmon & Trout Association, Association of Salmon Fishery Boards and the Rivers and Fisheries Trusts of Scotland, and so is inevitably focussed on Scottish salmon farming, although the issues are mostly generic. Our comments are made with the knowledge that the Scottish industry intends to significantly increase production to fill the void left by deteriorating operating conditions in other countries – without first addressing its existing impact.

#### Specific Issues

Official denial – there is little in these draft standards that alludes to the severe impact salmon aquaculture has inflicted on wild salmon and sea trout and the surrounding freshwater and marine aquatic environment. Governments and industry are still in public denial, despite the wealth of peer reviewed scientific literature confirming the devastating effects of parasites and disease transferring

from farms to wild salmon and sea trout; biological and chemical pollution emanating from farm units; and fish farm escapees adversely interacting with wild salmonids.

There are serious paradoxes in both Government, agency and industry positions on this with respect to the inspiration of and participation in initiatives that are overtly established to relieve these problems and the public positions and statements of these organisations on this matter (NASCO / TWG / Strategic Framework for Scottish Aquaculture / SNH policy statements etc). We believe that for an environmental NGO of WWF's stature and reputation to engage in discussions about mitigation of impacts of this nature without a clear recognition and articulation of these problems is untenable.

7 Point Plan – is vague and fails to show any teeth. Its underlying principle seems to be the need to prove parasite and disease impact on wild salmonids against ambient natural levels before any action is required. This is further proof of official denial, and completely ignores the precautionary principle. The plan also suggests that impacts can be 'minimised, but this is an illusionary target impossible to achieve under current open system management. Wild fish, especially juveniles, can only be protected if there is no interaction with farmed fish.

Safe distance location - the draft discusses what might be a safe distance for salmon farms to be located away from wild salmonid migration routes. It is impossible to make a generic prediction of a safe distance, given the site specific nature of these impacts. The location of salmon farms must be established on an individual site basis, taking into account specific local issues and reliable lice dispersal models – not stabs in the dark.

Non natives - The draft suggests that non native species can be introduced if they are assessed to pose an acceptable level of risk. This is totally irresponsible and unacceptable to wild fish interests – non native control is impossible under an open system management.

Freshwater smolt units – there is little mention in the draft standards covering smolt producing units in freshwater where the risk of introgression due to serial escapes is higher than from marine cage sites given the life stage at which escapes will occur. This is an extremely serious omission, particularly as Norway, the world's largest producer of farmed salmon, already prohibits smolt units on rivers containing wild salmonids. This should be the basic standard and targeted aspiration across all Atlantic salmon producing countries where there is conflict with wild stocks

#### Action

To remain credible in this debate, WWF must make clear recommendations to move the industry towards environmental sustainability. Without this, the document is worthless.

- It must be made clear that the Precautionary Principle is the overriding concern of these standards.
- WWF must also commit to the principle that economic issues can never be allowed to override environmental protection.

- Relocation – It is clear that, under current available technology, there is an inherent incompatibility at many sites between intensive farmed cage units and sustainable wild migratory salmonid fisheries. This problem will only be relieved through the strategic relocation from sensitive sites. If WWF is looking for common ground with the industry, then there could be no better and more credible short to medium term strategy than the pursuit of the objective of actively encouraging the development of large offshore sites where impacts are likely to be manageable, to allow the relief of pressures on sensitive inshore sites. This may allow the industry to expand but, whilst doing so, could create opportunities for the relief of pressures in certain locations and in so removing these farms allow for targeted monitoring and research to start to quantify the nature of these impacts.
- Triploids – in the medium term, the safest way to protect wild salmon gene pools is to make the stocking of triploid salmon mandatory – within agreed time scales - on all salmon farms. WWF should include this issue as an industry target.
- Enclosed systems – the only long term solution to making aquaculture secure and environmentally sustainable is to move to totally enclosed systems, whether on land or at sea. Such installations would genuinely minimise escapes (rather than providing lip service to the issue), prevent transfers of parasites and disease, and allow waste effluents and chemical treatments to be collected and treated in order to avoid environmental pollution. The industry must research the necessary technology as a matter of urgency, and within time scales set by the Scottish Government after consultation with aquaculture and wild fish interests.

### Summary

As an environmental NGO, WWF MUST be prepared to target, articulate and address some of the obvious problems associated with negative interactions between wild and farmed fisheries, whether in the Atlantic or Pacific. Without that overt commitment, this document will fail totally to attract support from the main wild fisheries bodies. WWF should clearly identify solutions such as the relocation of sites away from sensitive areas, but even these must be seen purely as short to medium term remedies. The overwhelming view of the reactions to this paper, and similar initiatives in other countries, is that both marine and freshwater salmon aquaculture must be separated from wild migratory fish. With evidence of unnaturally high lice drift over more than 70 miles in some locations, this is the only way to stop parasite and disease transfer, and guard in any credible way against fish farm escapes interacting with wild fish.

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13 November 2009

Jonathan Shepherd and Andrew Jackson, International Fishmeal and Fish Oil Organisation (IFFO)

Comment(s):

1. Insistence on ISEAL based standards

We strongly contend this requirement regarding ISEAL only based standards - as it is unreasonable and unwise



We strongly propose that either ISEAL or ISO-65 accreditation should be deemed acceptable.

ISEAL is an association of like-minded NGO-led schemes, not a formalised ISO accreditation scheme or accreditation evaluation system

ISO 65 accreditation meets the needs of markets and businesses and exceeds the credibility of an ISEAL alliance and suggested methodology.

We feel that the ISEAL only requirement is principally to support other NGO based schemes and is not a reasonable or adequate stand-alone criteria.

We put forward the following reasons for ISO 65 based programs:

- ISO 65 is the required and recognised credibility measurement for a number of the already existing Aquaculture and Food Standards eg GlobalGAP, BRC Global Food Safety Standard, IFS, EU Organic legislation etc
- ISO 65 is the base requirement for equivalence benchmarking by the global retailers through the Global Food Safety Initiative
- Unlike ISEAL, ISO 65 is globally recognised for its competency based accreditation system

ISEAL has established standard-setting methodology which is loosely based on ISO Criteria from different ISO Standards, there is no formal evaluation that all methodology is adopted by signatories

- The ISEAL process does not easily accommodate existing standards such as IFFO's Responsible Supply scheme. This Feed Standard is already established and aligned to ISO 65
- IFFO has developed its RS scheme as a Business-to-Business scheme in response to supply chain needs (rather than an ecolabel to consumers)
- By its nature the ISEAL approach is very time-consuming. This in turn means the costs of ISEAL on top of ISO 65 can act as a disincentive to improvement. We believe the feed issues involved in aquaculture need urgent resolution. The credibility is being satisfied by the ISO 65 based IFFO RS standard.
- To ensure credibility, transparency and lack of bias, all ISO-65 based schemes are:
  - Governed by a Standards (Technical Advisory) Committee process that balances stakeholders involvement in Standards setting
  - Subject to defined set of objectives and communication points defining the scope and intent of the Standard
  - Subject to defined competencies and transparency for all parties
  - Subject to external peer review and assessment by an IAF Accreditation Body to ensure full compliance

## 2. Importance of FAO Code of Responsible Fishing (incl exclusion of IUU fish)

We wish to draw attention to the fact that the fishery assessment part of IFFO's Responsible Supply scheme (RS) is entirely linked to compliance with all of the fishery elements of the UN FAO Code of

Responsible Fishing; the other parts of the RS scheme are linked to traceability and responsible manufacturing practice, including the all-important exclusion of illegal, unregulated and unreported fish. This being the case we submit that IFFO's RS scheme should be deemed an appropriate measure for assessing the sustainability of fisheries as well as for traceability purposes.

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12 November 2009

Blake Lee-Harwood, Sustainable Fisheries Partnership

This letter forms part of the public response by Sustainable Fisheries Partnership to the document 'Draft Indicators for environmentally, socially and economically responsible salmon farming' which is available for public comment until November 30, 2009.

We would particularly like to comment on Principle 4.2 which states that:

*"4.2.1a: As of 20XX or upon availability the percentage of fish product (meal and oil) in feed that is certified under an ISEAL Alliance accredited scheme*

*4.2.1b: Prior to availability of such product as noted in 4.2.1a, the percentage of fisheries products in feed that meet a minimum sustainability requirement."*

We propose replacing this text with:

*"4.2.1.a: The preferred option is that feed should come from fisheries certified by an independent, third-party, FAO and ISEAL compliant, eco-label scheme.*

*4.2.1.b: At the current time, as a minimum requirement, uncertified source fisheries must score 6 or above on all FishSource scores (prepared by Sustainable Fisheries Partnership on [www.fishsource.org](http://www.fishsource.org)) and provide evidence of progress towards certification."*

At some point in the future, perhaps when the majority of source fisheries are certified, then the minimum requirement should be certification.

SFP believes that great caution should be taken in using FAO or IUCN as sources of information that relate to the sustainability of fisheries. Both sources are frequently incomplete and out of date, for instance a recent check of IUCN revealed that of the 156 different species/fisheries (main commercial sources):

- Only 20 have been evaluated by IUCN (13%)
- Only 1 is reported as critically endangered – Southern Bluefin Tuna. It was last updated in 1996
- Only 3 are reported as endangered, of which 2 were last updated in 1996
- Several species that are important feed sources for aquaculture ( eg: menhaden, anchovies, capelin, blue whiting) have not been evaluated by IUCN

FAO ratings are usually established at the level of FAO statistical areas, not the fishery itself, are not regularly updated and sometimes make judgements based on limited data.

IUCN and FAO represent useful sources in the absence of other data but would be too weak a standard for sustainability if taken on their own.

Using Fishsource as an alternative measure of sustainability means accessing the most current fisheries data in the public domain. FishSource is not an eco-label, and does not involve the detailed on-site evaluations and audits of the MSC program, nor is it ISEAL compliant. FishSource only gathers and summarizes publicly available information that helps analysts estimate how a fishery measures up against common sustainability standards.

Fishsource scores provide an indication of how the MSC would likely score a fishery. Under the current method, FishSource scores of 6.0 and 8.0 are equivalent to MSC scores of 60 and 80 respectively. The FishSource website provides a quick way of assessing this information for the main forage fisheries globally. However, any user can take the FishSource current methodology and derive the same scores themselves.

Almost all of the main pelagic fisheries that are sources for fishmeal and fish oil for salmon are listed on FishSource. Where a particular fishery is not listed on FishSource, then the supplier should contact the Sustainable Fisheries Partnership, clearly identify the fishery, and preferably provide SFP with stock assessments and other publicly available information and SFP will prepare a FishSource profile.

SFP also believes that there is value in defining common feed sustainability standards across aquaculture species and notes that Fishsource is currently incorporated into draft Aquaculture Dialogue standards for tilapia and pangassius.

SFP recognises that there may be concerns among some stakeholders that incorporating Fishsource into a feed standard might be seen as creating some form of institutional role for SFP itself. In response to these concerns we would emphasise the importance of using the Fishsource **methodology** as the basis for a standard, not the current website/database or owner, and the relative ease with which the methodology can be applied without resort to SFP itself.

In addition to our comments on deriving standards we would also add that we do not believe a time limit can be specified for when the requirement for certified fisheries should be met since this depends in part on how many fisheries and how much volume of product becomes certified.

We also do not believe that adopting criteria around percentages of fish meal and oil from certified source fisheries in feeds is a practical proposition. The precise ingredients of aquaculture feeds are often

a commercial secret and although verification is technically achievable it remains essentially impossible from a practical point of view.

It may be useful to include additional information in notes or an annex which provides further guidance on feeds and certified source fisheries. Such text could include the following:

“In order to help feed source fisheries to improve and become certified, farms can:

- Communicate in writing to the feed supplier the need for improvements and/or certification in the fishery.
- Seek written confirmation from the feed supplier about the improvement and/or certification actions that are being taken.
- Assess progress by confirming whether or not FishSource scores are rising, and/or whether certification is announced.

Feed suppliers can clearly demonstrate moves to certification through undertaking an MSC (or equivalent) pre-assessment, or the formation of a client group to undertake a full-assessment.

A few source fisheries may be missing scores on FishSource. This happens when, for example, there's no stock assessment for the fishery, the stock assessment is not public, or there's a stock assessment publicly available but some data is missing and thus scores cannot be computed (e.g., no biomass reference points in place, no fishing mortality reference points, no harvest rule in place to anticipate when biomass drops to/below a given limit).

In this instance the supplier should read the detail of the FishSource profile to determine why no score has been derived, and take the following actions:

- No stock assessment: Avoid sourcing. Engage suppliers to encourage the fishery to undertake an adequate stock assessment, and/or encourage the fishery to investigate seeking MSC certification under the methods developed for "data deficient" fisheries.
- Stock assessment exists, but is not made public: Avoid sourcing. Engage suppliers to encourage the fishery to make the stock assessment public.
- Target reference points have not been defined: Read the explanatory material on FishSource to assess whether the fishery is thought to be overfished or not. If the fishery is thought to be overfished, then avoid sourcing. Engage suppliers to encourage the fishery to set appropriate target reference points.
- Quotas have not been set: Read the explanatory material on FishSource to assess whether the absence of quota setting is permitting overfishing. If it is, and the fishery is at risk of becoming overfished, then avoid sourcing. Engage suppliers to encourage the fishery to set quotas.”

This response represents SFP's initial observations on the feed issue in the draft indicators document. We will contribute further observations before the November 30 deadline.

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Date: Nov 15, 2009 5:38:38 AM

Hilde Røddås Johnsen and Frode Strønen, The Norwegian Coastal Fishermen Union

Comment(s):

The Norwegian Coastal Fishermen Union expresses our appreciation of your work of reforming the catastrophic unsustainable fish farming industry.

We will also comment the weakness that representatives from the fishery community are not represented among the participating organization.

We believe that such participation would have highlighted sectors which problems are underestimated. A short description of negative impacts from the fish farming industry, where your participants Marine Harvest is the biggest company and FHL organize most of them, our members are facing explains the need for a broader approach.

Our members operate the smaller segments of the Norwegian fishing fleet. They are spread along the whole coast and many of the vessels can only fish in sheltered coast- and fjord areas. Consequently, in all part of Norway there is an interaction between the fish farming industry and the fisheries. In the past it is correct to say that the fisheries operated in a by and large natural ecological system, while it now by fish farming is created an artificial one. No or very few areas are untouched, but some areas face more problems than others and the problems are expanding in line with the industry expansion.

It the past the fishing of salmonids in salt water represented a significant source of income in many coast and fjord communities, fisheries which to day by and large is prohibited. With the general economical development it is reason to believe that with a responsible administration which would have maintained the stocks on an optimal ecological level, such fishery would at least have hade the same importance to day. The Norwegian Coastal Fishermen Union welcomes initiatives which contribute to the reestablishment of past natural richness.

However, the main problems nowadays are related to negative effects on the fisheries targeting other species. For many years fishermen especially in western Norway have experienced problems stemming from the fodder leakage from open net cages. The leakage can now roughly be estimated to 100 000 metric tons, based on information from the Norwegian Institute of Marine Research. The fish oil lost equals dumping of at least 300 000 tons of wild fish, making Norway to one of the worst in such activity. The lost fodder also contains some 10 000 tons of grain and other vegetables. This is an unethical practice.

Especially saithe pasture on this waste. Because of the fat level in the pellets, the saithe meat changes texture and in worst case become unsaleable. In some areas the problem is so severe that the fishery simply has stopped, or boats have been denied delivery of parts of the catch, or the price has been reduced. In the county Rogaland, the sales organization Rogaland Fiskesalgslag has a separated line in the price list for "pellets saithe", with half price comparing to the minimum prize for saithe in natural condition. With NOK 3 per kilo the economy of our members are under pressure.

The Norwegian fish farming industry has never admitted commitment to compensation for losses the business is causing, and the fish farming also reduces the total catch of the more environmentally sustainable fishery as the total quota for saithe normally is not caught.

Other species like cod, pollock and haddock are also hit by the pollution, but to a lesser degree.

The Norwegian research Institute NOFIMA has findings indicating that wild fish in huge quantities migrating between farms spread diseases. The institute states that this influences the eco system beyond human control. The indicators are found on farmed fish. It is to our knowledge not research related to the consequences for the wild fish stock.

There are also revolving conflict with our members, who have historical rights to their places of activity, and establishment of new farms, being in good fishing locations, spawning grounds or in currents carrying vulnerable fish eggs, larvae or juvenile fish.

The quickly expanding use of cleaning fish for defeating salmon lice is reaching such a level that it may have impact on the ecological system in the very important strand zone. No research is done on this potential threat.

The impact from the fish farming has thus known and unknown negative consequences for our members which have to be addressed in a work defining an environmentally sustainable fish farming method.

The foregoing describes the most serious impact from the fish farming industry. In the following we will comment draft Principles and Criteria which has influence on our member's ability to carry out their profession. That does not mean that we necessarily agree to uncommented subjects, but we consider eventual problems less significant for the salt water fisheries our members are conducting.

Conditions for our evaluation:

1.0 We notice that "The salmon Dialogue is a science-based forum initiated by World Wildlife Fund.."

1.1 That also implies that when sciences have not established acceptable knowledge, the principle must be that doubt about consequences causes refrain from activity.

For explaining the importance of 1.1 we refer to the work of Professor Are Nylund and his team at the University of Bergen, Norway. The science has since the end of the last decade known that there was a salmon disease X as the high mortality rate could not be explained with known diseases. Only in the recent years connections has been discovered in a single cell parasite dependant on lice as host. Controlling the lice level in the farm probably reduces the risk for parasite caused disease within the farm. But with the extreme amount of lice in open water as a result of fish farming, there is no scientific knowledge about consequences for salmon, sea trout or other salmonids, or fish from other families, or whether the parasite can be spread from salmon lice to other types, for example the types found on cod.

Fish farming has complex influence on the ecological system, and comparing to known and possible negative impact the scientific research and knowledge level is so fragmented that this fact must have decisive importance as the benchmark for a standard based on ecological principles.

Principle 1. Comply with all applicable international and national laws and local regulations.

We agree to the principle and criteria definitions. As criteria have not yet been operationalized, we will recommend that the European Union Water Framework directive becomes one legal framework for the principle. Recognizing that many factors stemming from the modern society reduces the water quality, yet a ecological standard for fish farming must comply to the criteria "very good ecological status".

Principle 2. Conserve natural habitat, local biodiversity and ecosystem function.

We will not evaluate the criteria as the draft indicates that they are in conflict with Conditions 1.0 and 1.1 above. Our position is that fish farming shall not alter natural habitats, local biodiversity and ecosystem functioning as such changes according to recognized ecological science has unforeseeable consequences, the so-called "butterfly wings"-principle. The chosen technology must be based on this position. We will not recognize a standard that to greater or lesser extent adopt criteria which accept influence and changes of natural habitat, local biodiversity and ecosystem function.

Principle 3. Protect the health and genetic integrity of wild populations.

As a general comment we refer to Principle 2. This also comprises the NOTES ON CRITERIA 3.2. It is our opinion that the UN convention which comprises the prohibition of introducing foreign species-The United Nations Convention on Biological Diversity- shall have priority. The consequence is that Atlantic Salmon shall be prohibited from farming in the Pacific Ocean as well as Rainbow Trout being prohibited in Norway as long as escapes and other interaction with the wild life spreading known and unknown diseases, occurs. If such species shall be allowed such practical and theoretical effects must be eliminated by technology as defined in the standard.

It is also noted that sea trout specifically is not mentioned although this species is exposed to lice when in salt water, which in parts of the fish` cycle means the whole year. The seriousness of this weakness is exemplified in the fact that this year in the Norwegian Hardanger fjord the lice level was relatively low during the wild salmon and smolt migration period. But during the autumn the lice amount has reached a catastrophic record level in parts of the fjord system for the Sea Trout which permanently stays in the polluted water when not in the rivers. The Norwegian Institute of Marine Research has recently issued a report which ingress states: (my translation)" The Institute is very concerned about the development in the salmon lice situation with increased infection rate and growing problems with resistance. We may face a catastrophe for both the fish farming industry and our wild populations of salmon and sea trout."

Principle 4 Use resources in an environmentally efficient and responsible manner.

Recognizing that our members are among those in Norway who will be most severe hit by the greenhouse effect due to acidification of the ocean, we recommend that under 4.5 also carbon emission caused by fodder transport and production is included in the criteria.

The Norwegian Coastal Fishermen Union expresses our wish that our view and comments will be incorporated in the final document. It is our strongest wish that both parties can operate in the same environment which in an ecological sustainable condition produces economically viable results. With these words we wish you good luck with your further work.

Yours Sincerely,  
Hilde Rødås Johnsen  
Manager

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Date: Nov 23, 2009 3:42:14 AM  
Lars Tomasgaard, Nordox AS

Comment(s):

Attended the meeting in Bergen. Unfortunately, I found that that the meeting was very focused on feed issues and that there was little interest in other parameters in the standard.

I am submitting these comments on behalf of Nordox AS a producer of copper oxide for antifouling.

We note that the standard talks specifically about copper as being the only antifouling agent. Although copper is the dominant AF agent it is not the only one and several agents are used as cobioicides. There is no global approval scheme in place and few national approval schemes are operational and any restrictions or complications in the use of copper may increase the use of other biocides. The standard should thus focus on BIOCIDES rather than just copper.

There is no reference to fouling. Clean nets are important to maintain good fish health, avoid infections and structural integrity of fish pen to avoid escapes. To be certified, the farm should thus have essentially clean nets achieved either physically or through antifouling or other methods.

The document proposes the use of total copper measurements and setting a standard for this. I would advise against this for a number of reasons.

- total copper is a very poor indicator of potential environmental problems. Copper tends to bind with especially sulfur, but also organic matter and become unavailable in sediments. Typical sulphur rich sediments under fish farms will be very likely to deactivate copper.

- new locations for fish farms have resulted in sediment piles under fish farms becoming less of a problem.

-natural copper concentrations vary considerably. Setting a defined limit may mean that some sites will have higher natural sediment copper content than the standard allows.

-scientifically there is agreement that AVS(acid volatile sulphide) > SEM(sediment extractable Metals) means no toxicity. The standards should take this into account if setting a standard. However. Trace metals measurements are difficult and expensive. I would suggest that other elements proposed in the standard (redox, sulphide) will cover this issue since only fish farm with sediment pile significant enough



to create problems with the standard in sulphides and re/ox can be expected to have copper concentrations significantly higher than reference sites. The problem with copper under nets has been solved in Norway now since current locations have sufficient water exchange to prevent the build up of sediments under pens. Also, net Antifouling technology has evolved so that current coatings are flexible and water based thus avoiding flaking off as happened with old technology. The problem with copper at net washing stations is also eliminated since they are now legally required to have effluent treatment systems in place.

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Date: Nov 23, 2009 1:07:22 PM

Blake Lee-Harwood, Sustainable Fisheries Partnership

Comment(s):

This note forms part of the public response by Sustainable Fisheries Partnership to the document 'Draft Indicators for environmentally, socially and economically responsible salmon farming' which is available for public comment until November 30, 2009.

We would particularly like to comment on Principle 4.2 which states that:

"4.2.1a: As of 20XX or upon availability the percentage of fish product (meal and oil) in feed that is certified under an ISEAL Alliance accredited scheme

4.2.1b: Prior to availability of such product as noted in 4.2.1a, the percentage of fisheries products in feed that meet a minimum sustainability requirement."

We propose replacing this text with:

"4.2.1.a: The preferred option is that feed should come from fisheries certified by an independent, third-party, FAO and ISEAL compliant, eco-label scheme.

4.2.1.b: At the current time, as a minimum requirement, uncertified source fisheries must score 6 or above on all FishSource scores (prepared by Sustainable Fisheries Partnership on [www.fishsource.org](http://www.fishsource.org)) and provide evidence of progress towards certification."

At some point in the future, perhaps when the majority of source fisheries are certified, then the minimum requirement should be certification.

SFP believes that great caution should be taken in using FAO or IUCN as sources of information that relate to the sustainability of fisheries. Both sources are frequently incomplete and out of date, for instance a recent check of IUCN revealed that of the 156 different species/fisheries (main commercial sources):

Only 20 have been evaluated by IUCN (13%)

Only 1 is reported as critically endangered Southern Bluefin Tuna. It was last updated in 1996

Only 3 are reported as endangered, of which 2 were last updated in 1996

Several species that are important feed sources for aquaculture ( eg: menhaden, anchovies, capelin, blue whiting) have not been evaluated by IUCN

FAO ratings are usually established at the level of FAO statistical areas, not the fishery itself, are not regularly updated and sometimes make judgements based on limited data.

IUCN and FAO represent useful sources in the absence of other data but would be too weak a standard for sustainability if taken on their own.

Using Fishsource as an alternative measure of sustainability means accessing the most current fisheries data in the public domain. FishSource is not an eco-label, and does not involve the detailed on-site evaluations and audits of the MSC program, nor is it ISEAL compliant. FishSource only gathers and summarizes publicly available information that helps analysts estimate how a fishery measures up against common sustainability standards.

Fishsource scores provide an indication of how the MSC would likely score a fishery. Under the current method, FishSource scores of 6.0 and 8.0 are equivalent to MSC scores of 60 and 80 respectively. The FishSource website provides a quick way of assessing this information for the main forage fisheries globally. However, any user can take the FishSource current methodology and derive the same scores themselves.

Almost all of the main pelagic fisheries that are sources for fishmeal and fish oil for salmon are listed on FishSource. Where a particular fishery is not listed on FishSource, then the supplier should contact the Sustainable Fisheries Partnership, clearly identify the fishery, and preferably provide SFP with stock assessments and other publicly available information and SFP will prepare a FishSource profile.

SFP also believes that there is value in defining common feed sustainability standards across aquaculture species and notes that Fishsource is currently incorporated into draft Aquaculture Dialogue standards for tilapia and pangassius.

SFP recognises that there may be concerns among some stakeholders that incorporating Fishsource into a feed standard might be seen as creating some form of institutional role for SFP itself. In response to these concerns we would emphasise the importance of using the Fishsource methodology as the basis for a standard, not the current website/database or owner, and the relative ease with which the methodology can be applied without resort to SFP itself.

In addition to our comments on deriving standards we would also add that we do not believe a time limit can be specified for when the requirement for certified fisheries should be met since this depends in part on how many fisheries and how much volume of product becomes certified.

We also do not believe that adopting criteria around percentages of fish meal and oil from certified source fisheries in feeds is a practical proposition. The precise ingredients of aquaculture feeds are often

a commercial secret and although verification is technically achievable it remains essentially impossible from a practical point of view.

It may be useful to include additional information in notes or an annex which provides further guidance on feeds and certified source fisheries. Such text could include the following:

"In order to help feed source fisheries to improve and become certified, farms can:

Communicate in writing to the feed supplier the need for improvements and/or certification in the fishery.

Seek written confirmation from the feed supplier about the improvement and/or certification actions that are being taken.

Assess progress by confirming whether or not FishSource scores are rising, and/or whether certification is announced.

Feed suppliers can clearly demonstrate moves to certification through undertaking an MSC (or equivalent) pre-assessment, or the formation of a client group to undertake a full-assessment.

A few source fisheries may be missing scores on FishSource. This happens when, for example, there's no stock assessment for the fishery, the stock assessment is not public, or there's a stock assessment publicly available but some data is missing and thus scores cannot be computed (e.g., no biomass reference points in place, no fishing mortality reference points, no harvest rule in place to anticipate when biomass drops to/below a given limit).

In this instance the supplier should read the detail of the FishSource profile to determine why no score has been derived, and take the following actions:

No stock assessment: Avoid sourcing. Engage suppliers to encourage the fishery to undertake an adequate stock assessment, and/or encourage the fishery to investigate seeking MSC certification under the methods developed for "data deficient" fisheries.

Stock assessment exists, but is not made public: Avoid sourcing. Engage suppliers to encourage the fishery to make the stock assessment public.

Target reference points have not been defined: Read the explanatory material on FishSource to assess whether the fishery is thought to be overfished or not. If the fishery is thought to be overfished, then avoid sourcing. Engage suppliers to encourage the fishery to set appropriate target reference points.

Quotas have not been set: Read the explanatory material on FishSource to assess whether the absence of quota setting is permitting overfishing. If it is, and the fishery is at risk of becoming overfished, then avoid sourcing. Engage suppliers to encourage the fishery to set quotas."

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Date: Nov 27, 2009 7:49:28 AM

Andrew Mallison , Marine Stewardship Council

Comment(s):

Ref Sec 4.2 Source of Marine Raw Materials

The Marine Stewardship Council standard for sustainable seafood is a science based, independent and peer reviewed program and is the only standard to comply with FAO and ISEAL recommendations. Product integrity is protected through Chain of Custody audits throughout the supply chain. The MSC's standard incorporates an assessment process that reviews the health of the target stock, the impact on other species and the wider environment, and the adequacy of the management system to protect stocks and the environment from over exploitation before a fisheries' sustainability can be determined.

While the MSC program has to date been primarily applied to fisheries for direct human consumption, the MSC standard is also being applied to low trophic level fisheries directly used to produce fish meal and fish oil (e.g. Gulf of California Sardine fishery) and other pelagic fishery in the NE Atlantic that also contribute to fish meal and oil supplies. The application of the MSC standard to low trophic level species is also the subject of a MSC Board Working Group that has recently consulted with leading scientists and conservation interests. The Working Group is commissioning a range of simulation studies that will review the performance of a number of low trophic fisheries from various upwelling and other marine ecosystems. This work will assess the implications to dependent predators of fisheries management strategies consistent with the MSC's Fisheries Assessment Methodology.

We respectfully suggest the notes on criteria 4.2 include that, for sec 4.2.1b, MSC certification is used as an indicator of sustainability.

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Date: Nov 30, 2009 10:12:08 AM

Justine Reynolds, Sysco Corporation

Comment(s):

1. Preamble p.6: Standards are intended to be revisited and updated periodically (e.g. every 3 years) to ensure that the standards are based on best available scientific knowledge and management practices and to encourage continuous improvement. Question - Who is going to be involved and what is the process?

2. Principle 2: 2.1.2 AZTI Marine Biotic Index in Sediment and 2.1.3 Maximum levels of therapeutants and antibiotics in the sediment in the Allowable Zone of Effect (AZE). Question - What are AZTI and AZE specifically?

3. Principle 2, 2.1: First Bullet: Technical experts said Redox and Sulphide are both good chemical indicators for benthic health, though Redox seems to more prevalent globally than Sulphide with less risk of false positives due to poor electrode maintenance. Questions - If given a choice of chemical indicators what is the verification process in response to "false positives"? What will be the required frequency of testing? Will a in house testing be acceptable or will accredited third party laboratory testing be required?

4. Principle 2, 2.1: Second Bullet: Critical challenge here is to ensure proper quality control in sampling and in analyzing sample in the lab. The Scottish Environmental Protection Agency has well-established protocols for both on their website... Questions - In Boston questions were asked if standards would be taken from multiple countries. Is this still a possibility? Has consideration on how establishment of standards will effect developing countries?
5. Principle 2, 2.2: Third Bullet: For freshwater, P is the limiting factor and the best proxy for water quality. Question - What is P?
6. Principle 3: E. : Consequences for fams that show non-endemic diseases.....Question - What is the frequency of farm audits or testing to lose certification?
7. Principle 3: F.: Questions - How will a., b. and c. be controlled, confirmed? Frequency of verification?
8. Principle 4: 4.4: Still, we believe it is important to set a minimum percentage of recycled waste in the standards....Questions - If the percentage is set too low will farmers want to be adjust their recycling practices to the established standard? What is the motivation to exceed the minimum standard?
9. Principle 5: 5.3: Questions - Where does training programs at the farm level fit in the scheme? Will training be offered to auditors as well as farmers?

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Date: Dec 4, 2009 4:37:54 PM

Matias Medina, AVS Chile

Comment(s):

I would like to comment on Principle 2, Criteria 2.1. It relates to conservation of ecosystem functioning; however functioning is not assessed and really considered in any of the stated criteria. Although research on functional traits of benthic organisms and communities is scarce, it should be considered, or the Principle must be modified. It is clear that biodiversity relates to functioning but it does not necessarily explain functioning.

Other aspect I would like to comment is related to the Principle of Taxonomic Sufficiency proposed by Ellis (1985). The use of AMBI is a step forward, however, it is recognized that more effort is required in the taxonomic analysis. Considering the strong impact generated by the release and deposition of organic matter and the Hierarchical Response of biodiversity to contamination (Ferraro and Cole 1990) a detailed analysis (down to species) might not be necessary. More research is required to establish the right and common taxonomic level enough to detect impacts of aquaculture.

Continuing with the potential use of more advance and informative data than the sole estimation of biodiversity, the concepts of Taxonomic Diversity (instead of species diversity) and Taxonomic Distinction (Clarck and Warwick 1995-2001) must be considered and proposed in the Criteria of this

Principle. The estimation of this Indexes will bring much more information about the effects of aquaculture on biodiversity and ecosystem functioning.

Finally, I would like to express my concern on the use of Macrofauna as the group to be analyzed. Although the Criteria of Principle 2 does not specify the use of this group, it is with this group that the AMBI index is calculated. Macrofauna is much more variable and mobile than meiofauna, which I believe must be considered in studies assessing the impacts of aquaculture on biodiversity. Meiofauna is composed by a significant amount of different species; communities are less mobile and thus, they are constantly exposed to local stress; and different ecosystem functions have been attributed to it (i.e. bioturbation). Working with meiofauna implies a higher effort on sampling analysis, but there has been an enormous advance in recent years regarding sampling techniques, analysis and identification.

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11 December 2009

Fiona Cameron, The Atlantic Salmon Trust (AST) and The Sea Trout Group (STG)  
These comments are supported by the Scottish Anglers National Association (SANA)

#### 1. General comments

The AST and STG are opposed to the promulgation of a Standard which may foster public perception of farmed salmon as an environmentally sustainable product, while there is a risk that accredited farms may still be inflicting significant adverse impacts on wild salmonids and marine & freshwater habitats.

We would point out that the salmon farming industry continues to adversely impact wild salmonids even in countries which currently have (apparently) robust regulatory systems. The only justification for a new Standard is as a means of driving up standards considerably, and on a continuous improvement basis, and thus tackling the deep-rooted problems associated with open system salmon aquaculture.

- a) The draft document, as it stands at present, risks simply standardising farming practices which are flawed, and represent the lowest common denominator. There are insufficient signs that the Standard will present challenging targets which will drive up standards in the industry. In particular, this relates to addressing the problems caused by: amplification of parasites and disease; escapes from marine and freshwater cages; pollution of the environment by fish waste and uneaten feed.
- b) We feel that the indicators as currently drafted do not provide adequate protection from such a risk, for these principal reasons:
  1. Many of the parameters and measurements suggested as indicators represent areas of knowledge which are incomplete and under-researched – for example, salmon migration routes, sea lice dispersal patterns, sea trout feeding patterns. It remains unclear how the

- Standard will deal with measurements set against a background of scientific uncertainty. The only pragmatic solution would appear to be robust attention to the Precautionary Principle in stipulating where accredited farms may be sited. A long-term solution would also require to make provision not only for a built-in review process for criteria and indicators, but also for revision of accredited status in light of emerging science.
2. Several of the terms used within the document are insufficiently defined: for example “environmental sustainability”, “sensitive” stocks. We would query whether a word such as “sensitive” can be sufficiently robustly defined to belong in a Standard which depends on detailed measurement of impacts.
  3. The draft indicators require very substantial revision and re-shaping, to reflect the fact that many of the impacts which must be measured cannot logically or practically be measured at farm level. It will be necessary to make provision for measurement of certain impacts (for example, lice infestation of wild salmonids) on an area basis, and to set farm-level measurements within this framework.
- c) We can see nothing within the Draft Indicators which would be likely to encourage the salmon farming industry to move towards closed containment – a solution which we believe is, ultimately, the only way to ensure environmentally sustainable operations. It would be a pity to lose the opportunity to set the bar high enough to make investment in closed containment an attractive option for salmon farmers. The only way in which this can be achieved is to significantly strengthen overall operating standards within the industry, and to ensure that these are enforced, otherwise any accreditation scheme is in danger of giving a completely false impression to consumers as to the sustainability of salmon farming.
- d) The indicators do not currently acknowledge the importance of the impact on sea trout (*Salmo trutta*) populations. Since these fish remain in coastal waters throughout most of the marine phase of their life cycle, and therefore may be more vulnerable to local parasite and disease transfer, their interests must be specifically included.

## 2. Specific comments on Principle 3: Protect the health and genetic integrity of wild populations.

3.1.1. This documentation must be publically available. This should be extended to require the certified companies to make publically available information on their internal research programmes. We believe it's also very important that where diseases such as PD (Pancreas Disease), which are no longer on the notifiable list in the UK, exist in farm stock, farms should be required to make information on their disease status available to all interested parties; there is clearly a strong link between sea lice infestation of farmed fish and heightened susceptibility to disease; this in turn links to greater problems in administering sea lice treatments (the fish may be off-feed, or the salmon farming company may judge that the fish cannot stand the added stress of a bath treatment). Since it is impossible to monitor the progress of non-notifiable diseases in countries such as the UK, it is important not to lose the learning opportunity which a full disease database would represent, in terms of observable patterns of disease and links to other factors such as lice infestation.

3.1.2. If non-endemic notifiable diseases are detected on a farm, it should lose its certification until the cause of disease can be scientifically established, and the threat removed. The suggestion that the individual farm should be required to show through environmental testing that diseases have not “jumped into the wild” is impractical and unenforceable, and should be removed.

3.1.4. This should be changed to: ‘Maximum on-farm lice levels, related to a maximum agreed area lice level’. An effective lice dispersal model must be developed as part of this accreditation scheme in order to assess acceptable maximum farm/area lice levels. In some locations the lice dispersal model may indicate where more stringent standards are necessary to protect wild fish populations.

3.1.7b. There is a need for further research to gain additional knowledge of this, as “safe” area-level maxima will vary according to area. Again, in light of scientific uncertainty, a precautionary approach should be adopted.

3.1.7c. There is a need for specialists to create a standardised protocol for recording numbers of lice on wild fish (e.g. photographic images from counting stations), and a requirement for farms to invest in area/regional monitoring structures. Arriving at a pragmatic solution for adequately-resourced *independent* monitoring of lice on wild fish is the only way to monitor the impact of potential amplification of lice in salmon cages, in a manner which will gain the confidence of all stakeholders.

(See also point 8 in Recommendations)

3.1.8.b. We recommend acceptance of the suggestion (made by John Volpe) that a measurement of “number of fish” is added to the measurement of kilos of fish, since size of hosts is the significant factor.

3.1.8c. We do not believe that it is wise to attempt to define a widely-applicable ‘minimum safe distance’. It is impossible to make a generic prediction of a safe distance, given the site-specific nature of these impacts. This is complicated by the nature of the fjordic systems currently favoured by the salmon farming industry, due to their complex hydrography and exposure to strong winds and currents. Similarly, the most usual situation is for several salmonid rivers to issue into a single fjord or sea loch: do we therefore define distances from rivers or from the entire fjord? The example of damaging sea lice infestations being found on fish in the rivers of Trondheimsfjord (a fish-farm-free National Salmon Fjord) demonstrates the complexity of the situation. A lice dispersal model must be established to determine, as far as possible, the potential impact on wild salmonids. Knowledge of migration routes should also be taken into account as it becomes available, as should the list of sensitive and economically important inshore sites. This will, in the first instance, involve dealing with considerable scientific uncertainty.

3.2.1. The draft suggests that non native species can be introduced if they are assessed to pose an ‘acceptable level of risk’. We question how an ‘acceptable’ level of risk can be determined when we do not understand the ecosystem level impacts of non-native species, and when open systems allow full interactions with the surrounding environment. The impacts of non-natives can be very complex and take time to become apparent. We believe non-native salmon aquaculture should not be permitted for accreditation, unless within closed systems - where stricter control can be exercised and environmental impact genuinely minimised. We also believe that the Standard should recognise the potential for undesirable impacts from non native species introduced to salmon pens as cleaner fish, or as part of a multi-trophic aquaculture system.



3.3. We support prohibiting transgenic salmon on farms, and recommend that the Steering Committee seeks a clear legal definition of 'transgenic' from the technical specialists involved.

3.4. The NASCO Aquaculture Task Force recommendations should be included in the Accreditation scheme. The current indicators state; 'they seek only to minimise escapes from a farm'. It is important that funds are also made available to advance work on the impact of escapees on wild salmonids. The accreditation body must establish a mechanism for collecting area level funds from accredited farms for an independent body (such as local River/Fisheries Trusts in the UK) to genetically sample adult and parr salmonids in local river systems to determine the impact of farm escapees. This data should be used in the future to set standards on 'acceptable' impact.

3.5. It must be explicit that certain farms cannot be certified due to their location, as indicated through the list of environmentally sensitive and economically important sites, including all Special Areas of Conservation with Atlantic salmon named as a primary or qualifying species, the use of the lice dispersal model and any known – and future - information on migration routes.

## Recommendations

1. The AST and STG agree with other wild fish interests in suggesting that the Standard should provide a vehicle for moving the global salmon farming industry towards a strengthened Code of Practice, reflecting agreements made within the NASCO Salmon Aquaculture Task Force, in conjunction with the ISFA, and to which all NASCO countries are signatories. These objectives can be found by linking to <http://www.nasco.int/pdf/aquaculture/BMP%20Guidance.pdf> - 'Guidance on Best Management Practices to address impacts of sea lice and escaped farmed salmon on wild salmon stocks'.
2. We strongly support annual certification, and believe that farms must be required to show yearly operational improvements, beyond the set standards, to continue being accredited. There are numerous precedents for a requirement to demonstrate continuous improvement in order to retain accredited status.
3. The standards document must be restructured, so that the list of indicators is split into those required at individual farm level, and those required at an area level, taking account of the cumulative effect of several farms in a given management area. In order for this certification process to assess the impact on wild salmonids, the industry must be required to invest in **independent** monitoring at an area level. The logical conclusion of this is that it is unlikely that an individual farm would be accredited within a farming area unless all other units are included in the relevant area scheme; this level of control will be necessary in order to gain buy-in from wild fish and environmental interests.
4. An effective lice dispersal model must be developed as part of this accreditation scheme in order to assess acceptable maximum farm/area lice levels. Where wild salmonid migration routes are known using both current and future data - farms should only be established if the lice dispersal model shows minimal impact on salmonids using these routes. This model will also be relevant in determining the impact of lice from offshore farms. The costs of additional

research required must be shared by the industry, and fair contribution to such costs should be assessed as part of the accreditation process.

5. The location of farms is vital in determining their impact on native salmonids. This is lost within the current indicators. It must be explicit that certain farms, such as those located close to wild salmonid migration paths, cannot be certified, because it is impossible to eliminate escapes and disease transfer within open system aquaculture. The precautionary principle must be enforced in two ways:
  - The industry, in conjunction with wild fish interests (including Rivers and Fisheries Trusts where appropriate), must draw up a list of sensitive aquaculture sites where farms cannot be certified, both now or in the future, because of their potential impact on wild salmonid stocks.
  - The industry, in conjunction with wild fish interests (including Rivers and Fisheries Trusts where appropriate), must draw up a list of economically and genetically important catchments where there should be a presumption against future aquaculture development (where there is currently none) or a presumption in favour of relocation and restoration (where farm units already exist).
6. The indicators must include the environmental impact on sea trout (*Salmo trutta*) populations, as they remain in coastal waters throughout most of the marine phase of their life cycle, and therefore may be more vulnerable to local parasite and disease transfer. The lice dispersal model must therefore inform potential to impact sea trout populations, taking into account current research being undertaken into the habits and movements of sea trout in their marine phase.
7. All certified farms must be required **immediately** to stock smolts produced in enclosed freshwater systems, or in systems that have no significant wild salmonid populations – either present or historical – and are situated within the same country; we do not believe that the Standard should condone international trade in live fish, due to risks of transfer of disease and parasites (particularly non-native parasites). Net smolt pens in freshwater pose a greater risk of introgression, due to serial escapes, than marine cage sites, given the life stage at which escapes occur. Norway already prohibits smolt units on rivers containing wild salmonids. This should be the compulsory basic standard for certified farms, since the technology for such production is available, and proven at commercial scale.
8. We are anxious that the Standard should not offer immediate entry to the accreditation procedure for farms newly established in pristine areas. We believe that the farm should be required to establish a track record in monitoring environmental and ecological impacts before entering the procedure. Similarly, any farm in an area where no such monitoring of impacts has hitherto been carried out should be required to demonstrate an established monitoring protocol – if only to determine a base-line against which to measure improvement or deterioration in factors such as the ambient lice burden of wild salmonids. There are precedents

for such a requirement to build up a 'track record' – for example, the more robust organic certifications for terrestrial farms, both arable and animal-rearing.

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Date: Dec 15, 2009 7:19:54 AM

Pamela Parker, New Brunswick Salmon Growers Assoc.

The following are the comments being submitted on behalf of the New Brunswick salmon farming industry located in New Brunswick, Canada. Our industry supports the concept of certification in fact the majority of our industry currently operates under one of two international certification programs already in operation. However, we believe that all certification standards must respect the laws and culture of the jurisdiction where those farms are located; that they must be grounded in science; and that they must also be based on the ecosystem realities of each salmon farming region. It is also very important that the certification program that emerges does not serve as a barrier to international trade.

We have provided our comments on the various Principles and Indicators below (comments in all caps and bold):

Principle 1: Comply with all applicable international and national laws and local regulations  
- no indicators are available to respond to

Principle 2: Conserve natural habitat, local biodiversity and ecosystem function

2.1 Benthic biodiversity and benthic effects

2.1.1 Chemical indicator: Redox potential and/or Sulphide levels in sediment - PREFER SULPHIDE AS INDICATOR (Currently required by provincial regulation)

2.1.2 Faunal indicator: AZTI Marine Biotic Index (AMBI) in sediment - SHOULD ONLY BE USED IF THERE IS A CONCERN BY THE REGULATOR OUTSIDE THE ALLOWABLE ZONE OF EFFECT

2.1.3 Maximum levels of therapeutants and antibiotics in the sediment in the Allowable Zone of Effect (AZE). SHOULD NOT BE REQUIRED AS A STANDARD OPERATING MEASURE - ONLY BE USED IF THERE IS A CONCERN OUTSIDE THE ALLOWABLE ZONE OF EFFECT AND SHOULD BE SUPPORTED BY THE REGULATOR TO ENSURE THAT EFFECT IS NOT A RESULT OF OTHER INDUSTRIAL OUTFALL OR ACTIVITY IN THE AREA

2.2 Water quality in and near site of operation

2.2.1 Dissolved oxygen levels on farm during grow-out AGREE TO STANDARD TO KEEP RECORDS BUT NOT TO SET SPECIFIC LEVELS REQUIRED AS THESE WILL VARY DEPENDING ON ENVIRONMENTAL CONDITIONS AND TIME OF YEAR

2.2.2 Freshwater: Phosphorus concentration LEVELS ARE REGULATED; COULD SUPPORT N-P RATIO WITH CHLOROPHYLL AS A SURROGATE.

2.2.3 Freshwater: Dissolved oxygen at the water-sediment interface SHOULD BE MEASURED ONE METER FROM THE BOTTOM, OR AT VARIOUS DEPTHS THROUGHOUT THE WATER COLUMN.

OPERATIONS MUST BE ALLOWED TO MAKE SOME MEASURABLE AMOUNT OF CHANGE BASED ON WATER DEPTHS AT THEIR LOCATION.

### 2.3 Nutrient release from production

2.3.1 % fines in the feed (at the point where it enters the cage assuming technologically possible)  
VIRTUALLY IMPOSSIBLE TO MEASURE AND ENFORCE

### 2.4 Interaction with critical or sensitive habitats and species

2.4.1 Clear, substantive documentation on a) proximity to critical, sensitive or protected habitats and species, b) the potential impacts the farm might have on those habitats or species, and c) a program underway to eliminate or minimize any identified impacts the farm might have. NEED TO RESPECT JURISDICTIONAL REGULATION; EACH ECOSYSTEM WILL VARY

2.4.2 Distance from critical, sensitive, or protected habitats and species SEE NOTE ABOVE

2.4.3 Difference in levels of sensitive species pre-and post use of anti-louse compounds in areas where sensitive species are known to be. THESE TESTS HAVE ALREADY BEEN PART OF LICENSING APPROVALS FOR TREATMENTS WITHIN EACH COUNTRY SO THIS IS REDUNDANT BENTHC IMPACTS WILL BE COVERED UNDER 2.1

2.4.4 Mortality or morbidity of sentinel species around farm during louse treatment periods- SEE NOTE  
2.4.3

### 2.5 Interaction with wildlife including predators

2.5.1 Number of days where acoustic deterrent devices were used

2.5.2 Number of marine mammals and birds killed (number of instances of lethal action taken)

2.6 Cumulative impacts on biodiversity (combined previous Criteria 2.6 and 2.7) DELETE THESE POINTS ARE COVERED THROUGHOUT THE DOCUMENT

2.6.1 Presence or absence of selected sensitive or sentinel species

## Principle 3: Protect the health and genetic integrity of wild populations

### 3.1 Introduced or amplified parasites and pathogens

3.1.1 Presence of clear documentation of disease occurrences/outbreaks on-farm.

3.1.2 If non-endemic diseases and /or parasites are detected on farm, requirement to show through environmental testing that disease hasn't jumped into the wild and/or strong disease management practices through culling etc. SALMON ARE ENTERED INTO THE FARM DISEASE FREE; THEREFORE DISEASE ORIGINATES FROM THE WILD. WILD FISH DISEASE SURVEILLANCE IS NOT WITHIN THE CAPACITY OR THE RESPONSIBILITY OF THE SINGLE SALMON FARM APPLYING FOR CERTIFICATION. THIS IS A GOVERNMENT RESPONSIBILITY.

3.1.3 Re-occurrence of a specific disease over more than one generation (yes or no; or requirement to show through environmental testing that disease hasn't jumped into the wild).. SEE COMMENTS ABOVE.

FARMERS HAVE NO CAPACITY FOR TESTING WILD FISH AND CAN ONLY BE HELD ACCOUNTABLE FOR RESPONSIBLE FARM MANAGEMENT.

3.1.4 Maximum on-farm lice levels (average of X lice per farmed fish) IF ANY NUMBER IS TO BE RELEVANT IT MUST BE ECOSYSTEM BASED, CONSIDER THE TIME OF YEAR, PRESENCE/ABSENCE OF OTHER SPECIES, ETC. SCIENCE AND VET ADVICE IS CLEAR THAT PRESCRIPTIVE TREATMENT MAY CAUSE UNNECESSARY TREATMENTS AND LEAD TO RESISTANCE AND UNNECESSARY ENVIRONMENTAL IMPACT.

3.1.5 % of fish tested prior to transport. IS ALREADY PART OF TRANSFER PERMITTING PROCESS FOR LIVE FISH TRANSPORT

3.1.6 Method of transport of farm animals or other materials that reflects risks identified through pre-transport testing (degree of contact with ecosystem through open well-boats, towing cages, etc.).

3.1.7 Participation in an effective area-based disease management scheme (area defined in terms of wild salmon habitats and migration routes), actively monitored and enforced, that includes:

a. Required components or outcomes of the management scheme (e.g. age class control, fallowing)

b. Maximum area-level farm lice levels

c. Measurements of lice levels in wild salmon (setting a standard around either a year-over-year increase, or difference from published ambient lice levels.)

d. Measurements in the wild of diseases found on farm (setting a standard around either a year-over-year increase, or difference from published ambient lice levels.)

AREA BASED MANAGEMENT SHOULD BE ECOSYSTEM BASED AND SCIENCE BASED AND RELY ON FISH HEALTH EXPERTS. MANY OF THE ASSUMPTIONS BEHIND THE SUBPOINTS ABOVE MAY NOT BE SCIENCE BASED AND MAY NOT BE APPLICABLE TO ALL ECOSYSTEMS.

3.1.8 Infection pressure risk indicators, separate or combined into a single index, that includes:

a. Maximum density of fish on farm (kilos of fish/cubic meter)

b. Maximum density of fish farms in an area (kilos of fish/sq kilometer)

c. Minimum distance from sensitive migration routes, breeding areas, mouth of wild-salmon rivers

EACH OF THESE POINTS MUST BE SCIENCE BASED AND GROUNDED IN LOCAL ECOSYSTEM REALITIES SO STANDARDS MUST REFLECT THIS

3.2 Introduction of non-native species

3.2.1 Will protect against exotic species becoming established by either:

Allowing certification of non-native species only if the species is already farmed in the area/region/country or

Allowing non-native species to be introduced to new geographies only if they are assessed to pose an acceptable level of risk. SUPPORT THIS INDICATOR AS BEING SCIENCE BASED AND ENABLING AN ECOSYSTEM APPROACH.

3.3 Introduction of transgenic species

3.3.1 Prohibit transgenic salmon on farm

3.4 Escapes REQUIRES CLARIFICATION

3.4.1 % of fish loss that is unexplained per unit time

3.4.2 Number and % of fish escaped per production cycle (in marine and freshwater)

3.4.3 Number of episodes of escapes per production cycle (with potential look back over several years)

3.4.4 Compliance with a formal plan to assess and mitigate escape risk that includes: # of netpen inspections per year and other elements.

Principle 4: Use resources in an environmentally efficient and responsible manner

4.1 Use of wild fish for feed (dependency on marine protein and lipid sources)

4.1.1 Forage Fish Efficiency Ratio (FFER), calculated separately for meal and oil.

4.2 Source of marine raw materials (i.e. origin of fish used in feeds)

4.2.1a: As of 20XX or upon availability, the percentage of fisheries product (meal and oil) in feed that is certified under an ISEAL Alliance-accredited scheme.

4.2.1b: Prior to availability of such product as noted in 4.2.1a, the percentage of fisheries products in feed that meet a minimum sustainability requirement.

4.3 Source of non-marine raw materials in feed

4.3.1 Presence of feed supplier sustainability policy that, at a minimum, includes the ability to trace where their products came from, and complies with internationally recognized moratoriums and local laws.

GENERAL COMMENTS ON FEED IT IS SUGGESTED THAT BECAUSE FEED IS GENERALLY BEYOND THE RESPONSIBILITY OF THE SINGLE FARM BEING CERTIFIED THAT A FEED CERTIFICATION BE ESTABLISHED; ALLOWING A STANDARD TO BE DEVELOPED THAT WOULD REQUIRE THE FARM TO PURCHASE FEED FROM A CERTIFIED FEED SOURCE.

4.4 Non-biological waste from production

4.4.1 Existence of a functioning recycling policy

4.4.2 % of plastics and other recyclable materials that are recycled or reused

4.4.3 Evidence that all non-biological waste that isn't recycled is disposed of properly (including net pens and beach clean-up)

THERE ARE STILL REMOTE AREAS WHERE THERE ARE NO FUNCTIONING RECYCLING FACILITIES STANDARDS MUST REFLECT THAT WHERE POSSIBLE FARM WOULD HAVE A RECYCLING PROGRAM.

4.5 Energy consumption and greenhouse gas emissions (on farm)

4.5.1 Records of energy consumption during hatchery, smolt production and grow-out (e.g. volume and type)

4.5.2 Evidence of an energy use assessment for hatchery, smolt production and grow-out (e.g. energy audit, in-house estimates)

4.6 Non-therapeutic chemical inputs

4.6.1 % of copper-treated nets that are cleaned and treated at sites with effluent treatment

4.6.2 Copper concentrations in the sediment as compared to background levels HOW TO ESTABLISH BACKGROUND LEVELS?

4.6.3 Difference between concentrations of copper and zinc in indigenous and/or co-cultured species as compared to reference sites NOT POSSIBLE TO ACHIEVE NO LEVEL OF CHANGE; CHANGE DOES NOT ALWAYS INDICATE A NEGATIVE IMPACT

4.6.4 Difference between concentrations of copper and zinc in indigenous and/or co-cultured species as compared to published data indicating "normal" or background level for that species UNSURE WHAT THIS WILL ACHIEVE

Principle 5: Manage disease and parasites in an environmentally responsible manner

5.1 Survival and health of farmed fish

5.1.1 Frequency of visits by a licensed veterinarian

5.1.2 % of fish that are vaccinated for selected diseases

5.1.3 % of mortality that is cause

5.1.4 % of smolt tested for select diseases prior to entering grow-out phase (on farm)

5.1.5 Survival and/or mortality rate

AGREE WITH ENSURING FISH HEALTH RECORDS ARE MAINTAINED; MUST ENSURE THAT ANY SAMPLING REQUIRED IS REASONABLE

5.2 Contamination levels and health effects in local non-target organisms

5.2.1 On-farm documentation requirement: Documentation of all chemicals and therapeutants used during the audit period, the amounts used and the dates used.

5.2.2 Concentrations in benthos taxa of one or more chemicals/therapeutants, cross-referenced with the toxicity information made available by the drug manufacturer and/or regulator authorities.

SUPPORT 5.2.1 THIS REQUIRES MORE DEFINITION WHICH TAXA?

5.3 Therapeutic treatments INDICATOR IS REDUNDANT BASED ON INDICATORS ABOVE

5.3.1 Proof of proper dosing and/or concentrations for all antibiotics and therapeutants used, whether in feeds and in other treatments such as bath treatments.

5.3.2 % of therapeutic treatments that include antibiotics or chemicals that are banned in any of the primary salmon producing countries. THIS IS CONTRADICTIONARY

5.3.3 Grams of active ingredient used per kilo fish produced 5.3.4 % of medication events that are prescribed by a veterinarian

5.3.5 Frequency of tissue residue violations (or duration since last tissue residue violation for the site)

5.3.6 Minimum % of antimicrobial treatments that are applied because of a confirmed bacterial disease

5.4 Resistance of parasites, viruses, and bacteria to medicinal treatments MAINTAINING HEALTH RECORDS WOULD BE THE BEST INDICATOR OF RESISTANCE

5.4.1 Participation in region-wide resistance monitoring programs (Need to define some of the factors that would be required to be included in the program)

5.4.2 Presence of significantly reduced sensitivity towards relevant therapeutants in target organisms (detected in region-wide monitoring program)

5.4.3 Presences of significantly increased resistance in non-target organisms

5.5 Biosecurity management THE INDICATORS BELOW ARE COVERED IN OTHER INDICATORS ABOVE

5.5.1 % of cages that are single year class

5.5.2 Number of veterinarian visits per year

5.5.3 % of marine-based feed ingredients that are screened for disease

5.5.4 Risk index

5.5.5 Number of smolt suppliers (per site) THIS IS NOT RELEVANT EACH SMOLT SUPPLIER HAS HEALTH AND BIOSECURITY STANDARDS. SOME COMPANIES NEED TO BE ABLE TO SOURCE THE BEST FISH FROM EACH HATCHERY FOR EACH FARM. THE ISSUE SHOULD BE WHETHER OR NOT THERE ARE DEMONSTRATED FISH HEALTH AND BIOSECURITY PROTOCOLS.

Principle 6: Develop and operate farms in a socially responsible manner

IT IS IMPORTANT THAT THESE INDICATORS RESPECT THE JURISDICTIONAL AUTHORITY OF THE COUNTRY WHERE THE SALMON FARM IS LOCATED AND LOCAL CUSTOMS AND CULTURES

6.1 Freedom of association and collective bargaining

6.2 Child labor

6.3 Forced, bonded, or compulsory labor

6.4 Discrimination

6.5 Health and safety of workers

6.6 Wages

6.7 Contracts (labor) including subcontracting

6.8 Conflict resolution

Principle 7: Be a good neighbor and conscientious citizen

IT IS CRITICAL THAT THESE INDICATORS ARE WITHIN THE SCOPE OF THE FARM APPLYING FOR CERTIFICATION

7.1 Interaction with local communities and other resource users

7.2 Respect for indigenous and aboriginal cultures and traditional territories

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15 December 2009

Geoff Shester and Pete Bridson, Seafood Watch, Monterey Bay Aquarium

1 - Introduction

The Monterey Bay Aquarium welcomes the opportunity to comment on the Draft indicators released by World Wildlife Fund (WWF)-led Salmon Aquaculture Dialogue (SAD) for environmentally, socially and economically responsible salmon farming.



The Monterey Bay Aquarium's Seafood Watch program empowers seafood consumers and businesses to make choices for healthy oceans. The program works to transform seafood markets in ways that create incentives for sustainable fishing and aquaculture practices. Key elements of the program include efforts to raise consumer awareness about sustainable seafood issues, primarily through Seafood Watch pocket guides; and outreach efforts with retailers, restaurants, distributors, and other major seafood purveyors to encourage them to make the switch to sustainable seafood. Since its inception in 1999, the program has distributed over 32 million pocket guides and currently works with nearly two hundred partners across the U.S., including the nation's two largest food service companies who have made commitments to source seafood according to Seafood Watch recommendations. Our ranking criteria have been adopted and our recommendations are used by a variety of North American conservation organizations, including Environmental Defense Fund, FishWise, OceanWise, and SeaChoice Canada.

Given the tremendous pressure to identify sustainable aquaculture products at the level of individual farming operations, we are encouraged by the opportunity presented by the WWF dialogues to provide the first robust farm-level certification that we can directly recommend as sustainable. Therefore, the Monterey Bay Aquarium has been an avid supporter of the WWF Aquaculture Dialogue process for several years, participating in many dialogues around the world and sitting on the Global Steering Committee for the Shrimp Aquaculture Dialogues.

It is clear that the principles the Aquaculture Dialogues are closely aligned with those of our own Seafood Watch Criteria, giving us great hope for an equivalency between Aquaculture Stewardship Council certifications and our own definition of sustainable seafood. Such an equivalency would allow us to support any farm certified to the SAD standards as sustainable, without requiring us to conduct our own independent assessment. To provide this guarantee in terms of our recommendations, all farms certified to the SAD standards would need to be a Seafood Watch "Good Alternative" or "Best Choice" (i.e. yellow or green lists) to be considered sustainable. Failure to reach this equivalency will prevent our organization from being able to promote salmon products certified under this standard to consumers, partners, and seafood businesses. With this in mind, and with the intention of continued constructive support for the dialogue process, we offer the following comments (and specific recommendations where possible) to help the SAD achieve a sufficient level of robustness.

## 2 - General Comments

At this stage in the SAD process (draft indicators, but not standards), we recognize that we cannot assess the equivalency of SAD standards to the Seafood Watch criteria. Therefore, our analysis of the SAD draft indicators focuses on the extent to which the factors we consider in our Seafood Watch Aquaculture Evaluation Criteria are represented in the SAD draft indicators. Following a comparison of the SAD criteria and indicators and the Seafood Watch Aquaculture Evaluation Criteria we note that at this stage of the SAD's development process, almost all of the Seafood Watch criteria are addressed at some level. Therefore in general, we agree with the intent and content of the current Principles, Criteria and indicators, yet we continue to have reservations as to whether it will be possible to honor this intent with practical metric-based standards that can be applied and inspected at the farm level.

Relative to other forms of aquaculture being considered in the WWF dialogues, farmed salmon probably has the most well documented ecological impacts, notably the effects of escapes, disease transfer to wild stocks, nutrient and chemical effluents, and high use of feed. Therefore, it will be important as the SAD process moves forward to develop strong standards that comprehensively address these impacts, regardless of how many producers currently would meet the standards.

Given the severity of documented ecological impacts associated with net pen salmon farming, it will be a challenge to develop a SAD standard that equates to an overall yellow 'Good Alternative' Seafood Watch ranking. Recognizing the homogeneity of typical salmon farming methods and the associated environmental concerns, (and within the potential limitations outlined by recent Life Cycle Assessment studies) we therefore encourage the SAD to develop indicators (and standards) capable of recognizing or distinguishing the small number of producers who do produce farmed salmon in significantly more sustainable ways (such as freshwater salmon production in land based systems, or other 'closed' or contained production systems).

Seafood Watch is in the final stages of completing a ranking for farmed coho salmon grown to harvest size in freshwater tanks at inland locations, and is therefore familiar with the potential benefits, and the economic viability of these (and other similar) production systems. We will provide our report on this type of production system to the SAD in January 2010, when the report is released.

We also encourage the SAD to develop indicators and standards that not only recognize specific practices that demonstrate practical means to reduce key impacts of salmon farming (for example closed cages or integrated multi-trophic aquaculture), but also actively encourage their development and commercial application.

### 3 - Specific comments:

In addition to the general comments above, we have the following specific comments on individual principles, criteria or indicators.

Principle 1 Comply with all applicable international and national laws and local regulations.

Seafood Watch assesses the effectiveness of regulations to address key impact categories of aquaculture operations (such as siting, disease prevention and control, use of therapeutants and predator control) . The current SAD indicators only require compliance with existing laws without assessing any aspects of their effectiveness and relevance to the control of aquaculture operations. The remaining SAD principles and their standards must therefore be sufficiently robust on their own merit to ensure appropriate practices take place on certified farms.

Principle 2 Conserve natural habitat, local biodiversity and ecosystem function.

Seafood Watch criteria assess local (within 2x the diameter of the farm site), and 'regional' effects. SAD Principle 2 could be improved by clarifying whether its indicators and standards are designed for, and apply to, habitats within the Allowable Zone of Effect commonly used for regulatory siting and licensing purposes, and/or areas outside it. The success of this principle is dependent on the rigor of the standards yet to be developed.

SAD Principle 2 does not currently recognize or address the fact that the largest effluent load from salmon farm is in the form of soluble wastes. For example phosphorous concentration is only applied to freshwater sites at present (which is appropriate considering it's limiting nature in freshwater environments), but there is no equivalent for marine sites. This principle could be improved by addressing the effects of the (typically large quantities of) soluble nutrients on a local and regional basis for all salmon farming sites.

While maintaining appropriate oxygen levels (SAD indicator 2.2.1 - Dissolved oxygen levels on farm during grow-out) is important for stress minimization and therefore maximizing immune function, disease resistance and welfare, it does not appear to be a practical indicator to 'make sure the water quality around farms can support a healthy biodiversity'. It appears to place an unnecessary burden on the farm for remote monitoring for little practical benefit.

Seafood Watch criteria provide habitat examples relating to three levels (low, moderate and high) of habitat sensitivity. We propose SAD Criteria 2.4 (Interaction with critical or sensitive habitats and species) should include a robust definition of the 'critical, sensitive or protected habitats and species' on which this criteria is based, as this is vital to their protection.

The intention of this principle and indicator 2.4.1 is valid, but difficult to apply in practice. We propose certified farms be required to monitor identified sensitive habitats or species at risk for any impacts of the farm's operations, not just impacts specific to sea louse treatments (indicators (still under discussion) 2.4.3 and 2.4.4). It should be noted that the proposed alternative methods of benthic sampling for sea louse treatment residues will be biased in favor of bath treatments over in-feed treatments (i.e. residues of in-feed treatments are more likely to be detected in benthic sampling).

Principle 3: Protect the health and genetic integrity of wild populations Seafood Watch addresses the health and integrity of wild populations through the risks associated with escaped fish, and disease and parasite transfer to wild stocks. Wild stocks other than just salmon are assessed under these criteria.

We support the aims of the SAD Principle 3 (outlined in sections A-G), but point out that these are very similar to the variety of standards, codes of conduct, or codes of best practice that apply to various sectors of the salmon industry. In many cases these best practices are not successful in preventing the impacts they refer to e.g. escapes.

For example, point 'A' claims indicators 3.4.1 and 3.4.5 are 'Strong escapes indicators to minimize fish getting out'. In practice these indicators do nothing to prevent escapes or their subsequent impacts on wild populations from occurring.

Seafood Watch assesses the frequency of escapes, the native/non-native and genetic similarity status of escapees, and the evidence of direct impacts of escaping farmed fish on wild fish. Farmed salmon is probably the best studied of all farmed species with regard to these factors. Considering the inability of the SAD standards to prevent escapes, it must develop robust standards that protect wild populations from negative interactions with escapees.

Due to the genetic distinctiveness of wild salmonid populations and the widespread domestication of farmed salmon strains, all farmed salmon should be considered as genetically distinct from the same

species in the wild. The inability of the SAD standards to prevent escapes combined with the documented interactions between escapees and wild salmon highlights a major challenge for the SAD, and an aspect of production where aiming for the top 20% of existing farmers is unlikely to satisfy the requirements of Seafood Watch 'Good Alternative' rankings. Despite the recognized improvements in sea cage technology, warnings of increasing storm events and the precautionary principle highlight the need for the SAD standards to recognize those production systems (such as inland tank-based systems) that have the ability to produce robust (if not entirely fail-safe) barriers between the farmed and wild populations.

Where the SAD standards are applied to farming systems that have a significant risk of escapes (such as open-water open or closed systems), this risk must be addressed by indicators and standards that ensure that the escaping farmed salmon are unable to have a significant impact on wild fish by being physically, genetically and behaviorally similar.

Impacts on wild sea trout (or any other susceptible species) in addition to wild salmon should be acknowledged and addressed in the SAD standards and accompanying text.

Seafood Watch assesses the effectiveness of licensing to control the location, number, size and stocking density of farms. While the SAD indicators (3.1.8 Infection pressure risk indicators, separate or combined into a single index) address (subject to satisfactory standards) the density of fish on farms, density of farms in an area, and the distance from migration routes etc (indicators a,b,c), the size of farms is not covered. Recognizing the potential benefits from consolidating poorly sited farms into 'super-sites' in more suitable locations, total fish biomass on site is still an important parameter in the speed and scale of disease and parasite outbreaks. We recommend the indicators include a limit on single site biomass in this respect.

Seafood Watch does not assess animal welfare, but considers maximizing welfare to be important in minimizing the risk of disease or parasite outbreaks and subsequent potential impacts on wild populations. We support the addition of indicators or standards such as low maximum stocking densities (e.g. max 15kg m<sup>-3</sup>) that reduce stress and physical damage and maximize immune function.

Principle 4: Use resources in an environmentally efficient and responsible manner We agree with the intent of these standards but again recognize the difficulties faced by all the aquaculture dialogues to honor this intent with effective standards inspectable at the farm level. We recommend the SAD participates to the fullest extent possible in the cross-cutting discussions with other dialogues and supports the development of a specific set of feed mill standards.

It should be noted that the FFER method proposed (SAD indicator 4.1.1 following Tacon & Metian's 2008 paper) is not the same as the Tilapia or Pangasius Dialogue standards as claimed. The FFER calculations in Tacon & Metian (2008), (section 4 of the paper) uses the same method as the Naylor et al (2009) paper, and allows for the fish oil produced from the forage fish needed to supply the fishmeal, then calculates the additional amount of forage fish needed to supply the additional fish oil requirements. For a feed with moderate or high fish oil contents such as many salmon feeds, this calculation is open to criticism for producing a relatively high FFER value, and for the large amount of 'spare' fishmeal produced from the additional forage fish needed to supply the additional fish oil. The salmon farmer (in

this case) is penalized for this 'spare' fishmeal (in the high FFER value) yet the meal could be used for the production of other aquaculture species.

Recognizing the complexities of these calculations and discussions, we recommend the SAD use the Seafood Watch method (which is the same that used by the TAD and PAD) as this is the most transparent and understandable way of indicating the amount of forage fish needing to be caught to produce 'X' amount of farmed fish. While this method is also open to some criticism for similar reasons, its simplicity and transparency is of considerable value and any sources of error can be accounted by setting an appropriate standard for FFER relevant to this calculation method.

Principle 5: Manage disease and parasites in an environmentally responsible manner.

In addition to assessing the risks of amplification and retransmission of disease and parasites from the farm to the wild, and the introduction of novel disease and parasites, the Seafood Watch criteria consider the 'bio-safety risks inherent in operations'. The SAD Principle 5 indicators are based on 'open' production systems and provide no way to recognize the potential benefits for disease and parasite control in more 'closed' systems. This principle could be improved by including indicators that reward salmon farmers that use alternative systems with higher biosecurity characteristics than net-pen farms such as inland tanks or freshwater production.

Seafood Watch assesses the 'stock status of potentially affected wild fish'. This consideration does not appear to be addressed in the current SAD indicators. Wild salmonid populations in the various regions and specific localities where salmon are farmed have widely variable population status characteristics. We acknowledge the intent to only certify farms that are 'a minimum distance' from sensitive areas (indicator 3.1.8), but question the ability of the final standards to achieve this in practice.

We would like the SAD standards to prevent any negative interaction with wild salmonids, but on a pragmatic basis we encourage the SAD to include additional indicators that add further protection to particularly vulnerable salmonid populations or to specify that 3.1.8 should include a measure of wild salmonid status.

Seafood Watch recognizes the discord in current salmon farming practices between need to prevent disease and parasite outbreaks and the need to minimize chemical therapeutant use. Indicator 5.3.3 (Grams of active ingredient used per kilo of fish produced) seems to generate conflicting priorities in this respect.

This conflict (between effective disease or parasite control and limiting chemical use) arises in many cases due to inappropriate siting for example where a site is prone to sea lice outbreaks due to hydrodynamics or proximity to other farms. We recommend the SAD develops strong standards and supports rigorous enforcement to ensure salmon farming sites that require large or frequent chemical usage are not eligible for, or lose their certification.

Similarly, the intention of criteria 5.4 concerning resistance ('a farm that wants to be certified must bear responsibility for the cumulative resistance effects') must also be honored by strict standards and enforcement that ensure farms that are not able to reduce their numbers of parasites or pathogens due

to treatment resistance are not eligible for certification, and if already certified, have their certification withdrawn.

Indicator 5.1.1 and 5.5.2 (Number of veterinarian visits per year) needs clarification as to whether a high number of visits demonstrates positive disease monitoring and prevention practices, or is a negative result of frequent disease outbreaks and veterinary intervention.

Principle 6: Develop and operate farms in a socially responsible manner, and Principle 7: Be a good neighbor and conscientious citizen The mission of the Monterey Bay Aquarium is to inspire conservation of the oceans, and Seafood Watch does not currently assess social issues associated with seafood production. We acknowledge the efforts of the dialogue process as a whole to develop robust social indicators for the aquaculture industry.

#### 4 - Summary

In general, we agree with the intent and content of the current SAD Principles, Criteria and indicators, but question whether it will be possible to honor this intent with strong enough, practical metric-based standards that can be applied and inspected at the farm level. In this regard, it is unclear how the SAD can identify practices that either represent the top 20% of producers, or represent standards of sustainable production agreeable to the many stakeholders currently concerned with the global farmed salmon industry.

With these difficulties in mind, we encourage the SAD standards to provide the means to distinguish and reward the (perhaps of limited number initially) producers that are operating more sustainably or that have more sustainable aspects of their production.

As you move into developing standards it is of utmost importance that products certified to the SAD standards would not fall into the Avoid category. We have attached a blank copy of our scoring criteria for your reference to help ensure the SAD standards meet at least a "Good Alternative" overall ranking or higher. We are hopeful that the SAD standards will ultimately be robust enough so that we may offer our unequivocal support for any certified product when they are finalized.

We look forward to being able to review and provide further input to the standards associated with the current draft indicators.

(The Seafood Watch scoring criteria are available for download at:

[http://www.montereybayaquarium.org/cr/cr\\_seafoodwatch/content/media/MBA\\_SeafoodWatch\\_AquacultureCriteriaMethodology.pdf](http://www.montereybayaquarium.org/cr/cr_seafoodwatch/content/media/MBA_SeafoodWatch_AquacultureCriteriaMethodology.pdf))

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Date: Dec 15, 2009 3:52:32 PM

Tim O'Hara, no affiliation provided

Comment(s):

5. Feed. Fish meal and fish oil production is at global capacity and flat for the last 20 years. The majority of operating fisheries are working hard to become "sustainable". Aquaculture production will either level off or there will be more substitution of oils and proteins with plant-based or recycled alternatives. Diets that are net marine producers are already on trial.

7. Social. Nearly all "wild fisheries" are at or beyond sustainable levels. If we are to maintain the rights of all to healthy marine proteins as part of our diet, production will have to be through responsible/sustainable aquaculture.

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15 December 2009

Alison McGarry, New Brunswick Department of Agriculture and Aquaculture

This letter is in response to the invitation to input towards the draft indicators developed for the WWF Salmon Aquaculture Dialogues (SAD) process. I was fortunate to be able to contribute at the recent workshop in Bergen, Norway but would like to take this opportunity to express some key considerations for making the SAD a successful initiative.

There will be a real challenge in trying to link the certification of individual operations to area based management efforts as indicated under sections 3.1.7 (area-based disease management scheme) and 5.4.1 (region-wide resistance monitoring programs). The question of who would be responsible for development, monitoring and enforcement of such programs does not appear to have been addressed within the dialogues process. This is not an insignificant consideration, especially in light of 3.1.7 c and d, which would require monitoring of wild fish populations. The approach of requiring area-wide efforts involving multiple companies seems at odds with the philosophy of standards being developed such that only a portion of farms will be able to attain certification, which is our current understanding of the intent for the SAD. Thus, while the underlying intent is understood, requiring participation in area-wide programs, which may or may not be currently in place, is likely not appropriate as part of an individual certification scheme. It is advisable that, wherever possible, effort should be made to ensure that the measurable is something which is directly attributable to the operation and within the control of the farmer being certified.

I hope that these comments are useful in the continued development of the SAD. In New Brunswick, we have confidence that the regulatory environment in which our salmon farms are already required to operate will provide a solid foundation should companies choose to pursue a specific certification process.

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18 December 2009-12-23

Lise Bergan, Cermaq

The goals of the SAD process is to minimize or eliminate the key environmental and social impacts of salmon farming by defining standards that will drive the global industry towards improved performance.

Cermaq supports this initiative. As the dialogue is aiming at a site-level certification we believe a successful outcome of this process requires a set of indicators that efficiently measures the performance of an individual site.

The variation in natural condition between countries and even within a small area represents a special challenge when it comes to setting the actual standard, as it is evident that for most of the indicators it is hard to find one specific standard that would apply globally.

When defining indicators the actual auditing and certification process must be taken into account. The indicators must be defined in a way that allows for an efficient auditing process where the burden of certifications in itself would not leave companies outside. Much of this will relate to more procedural issues on implementation of the certification system. Regarding the proposed indicators key factors are number of indicators, cost of testing and analyses against the value added from the indicator and superfluous indicators. Indicators may be superfluous if the concern is addressed more efficiently by another indicator (e.g. a site would probably disqualify on indicators under 5.3. before indicator 2.4.4 would apply) or may be superfluous for individual sites dependent on the score on another indicator (e.g. if no antibiotics is used you should not need to test on antibiotics in sediments).

Many of the indicators are addressing external effects which can not be referred back to a single site. A certification system should not be based on one site being dependent of its neighbour performance for certification or re-certification.

Several indicators are addressing measures that are very effective if applied by all farms in an area, but where there will be no effect of the measures if one farm is not adapting these measures. Regulation would this be far more efficient tool than a voluntary standard for achieving results in this area.

As the indicators for Principles 6 and 7 are not available, we assume that there will be another option to revert to these at a later stage, and do not comment on these in any detail.

Principle	Criteria	Indicator	Comment	Proposal
1	1.1		We refer to comments submitted in March	
2	2.1	2.1.1 2.1.2. 2.1.3	The indicators may work, but common methods have to be defined. Global standards will not be possible.	
2	2.2.	2.2.1 2.2.2 2.2.3	These indicators are applied already. Here global standards may be found.	
2	2.3	2.3.1	See comment submitted from EWOS	
2	2.4	2.4.1.	The indicators is based on many terms that are not clearly defined, and where is might be impossible to make a definition that is useful.	Document a self assessment of potential impact on critical, sensitive or protected habitats or species due to location of the site.
2	2.4	2.4.2.	The distance itself does not impose an impact and is not a good way to measure. Even it the terms were defined it would not be possible to set a global standard.	Delete



Principle	Criteria	Indicator	Comment	Proposal
2	2.4	2.4.3. 2.4.4.	These indicators can not relate back to one individual site. What is measured may be caused by other farms or other industries/natural conditions.	Delete
2	2.5	2.5.1	The acoustic devices are used to keep predators away from the pens and setting a low limit for use acoustic devices will work contrary to minimize killing of predators. We believe 2.5.2. is a better indicator to measure the interaction with wildlife.	Delete
2	2.5.	2.5.2	The regulation of this issue varies and any standard should be in line with legislation in the individual country.	
2.	2.6.	2.6.1	We can not see how this can be implemented. We do not see this as a key indicator.	Delete
3.	3.1.	3.1.1.	This is done already by mortality reports and vet reports.	
3.	3.1.	3.1.2.	This is not possible to document through testing, as the spread of diseases in wild populations in not well known and there might not be a link between the test results and the individual farm.	Delete
3.	3.1	3.1.3	Same comment as above when it comes to prevalence on wild stocks	
3.	3.1	3.1.4	A standard should not set maximum levels that differ from the regulation as there is a balance between low numbers of lice and possible resistance against treatments. Coordinates and integrated pest management is most important and we should avoid a single site to treat according to lower levels in this standard in stead of adhering to coordinated management in an area.	Applying integrated pest management against sea lice.
3.	3.1.	3.1.5	A relevant indicator which we support, but it must be addressing the relevant disease in the area.	% of fish tested prior to transport for relevant diseases in the region
3	3.1	3.1.6	An example of what must be addressed by legislation as one site not complying with transport requirements might spoil the results for all other sites.	

Principle	Criteria	Indicator	Comment	Proposal
3	3.1	3.1.7	<p>Area management will not give effect for many measures unless all farms in the area participate. This is valid for the measures a, b, c, and d. See also comments under 3.1.4.</p> <p>For diseases found on wild fish there is too little knowledge to install sensible measurements and standards.</p> <p>Area management is a key measure, but has to be defined in regulations in order to ensure effectiveness. In the SAD standard area management is relevant under criteria 3 and 5 but should be included only in one indicator.</p>	<p>Participation in area management for effective management of diseases.</p> <p>Area management may be defined by national/local regulation or in lack of regulation may be set up as voluntary measures between farms in the same region.</p> <p>Factors that should be included for voluntary agreements are: sharing of sanitary information, coordinated treatment and coordinated following.</p>
3.	3.1	3.1.8	<p>This is normally regulated by maximum biomass per site, and an indicator may seem superfluous. Setting maximum biomass in an area should be done by authorities and can not be an indicator for an individual site. It would mean that a site will lose its certification if a new site was installed in the same area.</p> <p>We believe the standard should focus on impact, e.g. sea lice levels, escapes and the company's assessment of potential risk and risk mitigation etc. The distance itself is not a good criterion as the potential impact may be very different also within a region.</p>	<p>3.1.8.a. May work if present biomass limits for a site are integrated into the standard.</p> <p>3.1.8.b and c should be deleted</p>
3.	3.2	3.2.1	<p>Of the two alternative texts we prefer the second. We read "new geographies" as other continents.</p> <p>Who – other than the authorities - will make the assessment of what is an acceptable risk?</p> <p>The indicator seems inappropriate to apply for certification of an individual site.</p>	Delete
3.	3.3.	3.3.1	The indicator is fine, but it is important that the definition does not exclude triploids or sex reversed (?) fish.	
3	3.4	3.4.1	The company should report numbers and explanations for fish loss over a closed cycle	The reporting period should be a closed cycle
3	3.4.	3.4.2.	Fine	
3	3.4	3.4.3.	OK, but it should be forward looking only. Historic data would be captured by indicator 3.4.1.	Delete text in parenthesis

Principle	Criteria	Indicator	Comment	Proposal
3.	3.4	3.4.4.	This is not very clearly worded. We support this indicator if such plans are based on the current standards in Norwegian and Canadian industry.	
3.	3.5		See comment on 3.1.7 and 3.1.8	
4.	4.1		See comment submitted from EWOS	
4.	4.2.		See comment submitted from EWOS	
4.	4.3		See comment submitted from EWOS	
4.	4.4.	4.4.1.	The company policy itself should not be important, the focus should be on measures	Delete
4.	4.4.	4.4.2.	As the certification applies for a site the recycling/reuse indicator must cover only the materials used by the site.	
4.	4.4.	4.4.3.	Disposal of net pens is required by law and thus included in principle one. What is properly has to be defined.	Documentation that non-biological waste is disposed according to regulation.
4.	4.5	4.5.1. 4.5.2.	Fine	
4.	4.6	4.6.1	Fine	
4.	4.6.	4.6.2.	Monitoring the copper in the sediments is important. Correct background levels may be hard to find. If these data are available they may be used in the evaluation.	Delete “as compared to background levels”
4.	4.6.	4.6.3. 4.6.4.	This is not a proper indicator to measure the effect of an individual site. Indicator 4.6.2 should be sufficient to select the sited that are eligible for certification.	Delete
4.	4.6.	NEW	% of nets not treated with copper	This is “what good looks like”, and should be measured
5	5.1.	5.1.1.	The indicator may be measured, but this is not important as it does not state the sanitary standard.	
5.	5.1.	5.1.2.	Possible to do, but the diseased must be defined for each region depending on the actual disease situation and available effective vaccines.	
5.	5.1.	5.1.3.	It will be difficult to achieve a global standard on mortality by cause, but we would support this.	
5.	5.1.	5.1.4. 5.1.5.	Fine	
5.	5.2	5.2.1. 5.2.2.	Fine	
5.	5.3.	5.3.1.	Important indicator, but should be reworded	Change “proof” with “reporting”

Principle	Criteria	Indicator	Comment	Proposal
5.	5.3.	5.3.2.	This is hard to read as other than an introduction of a technical barrier to trade (TBT), and is outside the scope of the standard.	Delete
5.	5.3	5.3.3. 5.3.4.	Fine	
5.	5.3.	5.3.5 5.3.6	This relates to food safety which is outside the scope of the standard	Delete
5.	5.4.	5.4.1	See comments on 3.1.7.	See proposal on 3.1.7
5.	5.4.	5.4.2. 5.4.3.	What is measured does not necessarily relate to the operations of an individual site.	Delete
5.	5.5.	5.5.1.	Must apply for individual sites.	
5.	5.5.	5.5.2.	See comment in 5.1.1.	
5.	5.5.	5.5.3.	See comments from EWOS	
5.	5.5.	5.5.4.	Risk assessment would be an integral part of environmental management systems. Does this indicator seek to address risk related to biosecurity alone? It does seem superfluous as long as all the other measures throughout the standard are in place.	Delete
5.	5.5.	5.5.5.	Important indicator, but needs to be clarified what a supplier is: <ul style="list-style-type: none"> <li>- different generic egg source</li> <li>- different hatcheries/location (same owner)</li> <li>- different companies</li> </ul>	
6			Comments will be provided when draft indicators are available	
7			Comments will be provided when draft indicators are available	

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December 9 – 15, 2009

Marine Harvest Canada: Greg Gibson, Dave Pashley, Tina McMurdo, Margot Griffin, Sharon DeDominicis, Ian Roberts, Diane Morrison, Meghan Mills, Tiffany MacWilliam, Gerard Burry, Brad Boyce, James Rogers

Comment(s):

2.1.1 Chemical indicator: Redox

The use of a single chemical measure of environmental health does not provide a good reference. It is suggested that additional environmental data be collected to help interpret status of benthos. (for example Sulfide, TVS, SGS, visual).

2.1.2 Faunal indicator: AMBI

Agree to biological sediment assessment as a second step if sediment physical parameters and chemistry results reveal an environmental concern. Alternatively, suggest one only of sediment chemistry or biological sampling

2.1.3 Maximum levels of therapeutants and antibiotics in the sediment in the Allowable Zone of Effects (AZE). Recommend against this indicator for two reasons:

1. If other indicators that reduce the use of anti-biotics are adhered to this indicator is redundant.
2. Most anti-biotic residues are not biologically active so much more research is needed to determine if the indicator is valid.

Criteria 2.2 - There is currently no possibility of setting a meaningful minimum DO threshold. Oxygen levels in the ocean are clearly deterministic but can be at times highly unpredictable. I agree that we should continue to monitor DO at our farm sites within the cages as well as ambient levels but it shouldn't be assumed that the DO level is a result of the farm operation.

2.2.1 Dissolved oxygen levels on farm during grow-out

Agree to monitor DO but do not agree to a minimum DO threshold. BC waters are routinely affected by very low natural DO due to upwelling of deep oceanic water with high levels of nutrients. We would be willing to record the DO outside the cages in the general bay areas to ensure that the ocean is not significantly affected by the farm(s) operation.

2.2.2 Freshwater: Phosphorus

Monitoring of lake effluent impacts requires site-by-site environmental assessments to determine impacts of phosphorus to each individual lake. Instead of this detailed work we recommend monitoring the sediment N-P ratio with Chlorophyll A as a surrogate (substitute) measurement.

2.2.3 Freshwater: Dissolved oxygen (in lakes) at the water-sediment interface

We do not agree with measuring DO at the sediment-water interface rather at about 1 meter from the bottom. Or measuring at standard depths throughout the water column down to [bottom 1m].

3.1.2 If non-endemic diseases and /or parasites are detected on farm, requirement to show through environmental testing that disease hasn't jumped into the wild and/or strong disease management practices through culling etc.

No clear indicator is presented and the scope of this concern is much larger than aquaculture. More work needs to be done to make this indicator globally relevant. We would agree to work with local authorities to determine origin of disease/parasite. Wild fish are the mandate of a much larger regulatory body all assessments of this nature must be inclusive of stakeholders. A disease outbreak on a farm might trigger a higher level of investigation in wild fish depending on the local regulations.

3.1.3 Re-occurrence of a specific disease over more than one generation (yes or no; or requirement to show through environmental testing that disease hasn't jumped into the wild).

No clear indicator is presented and the scope of this concern is much larger than aquaculture. More work needs to be done to make this indicator globally relevant. We would agree to work with local authorities to determine origin of disease/parasite. Wild fish are the mandate of a much larger regulatory body all assessments of this nature must be inclusive of stakeholders.

4.1.1 Forage Fish Efficiency Ratio (FFER), different for meal and oil.

No clear indicator is presented. More work needs to be done to make this indicator globally relevant. This is the feed manufacturers responsibility.

4.6.2 Measuring copper in sediments.

Not a good measure of environmental effect due to local sediment variation and general non biological availability. Not a relevant indicator if 4.6.1 (all nets are washed at land based facilities with waste collection) is adhered to.

4.6.3 Measuring copper and zinc in non target organisms.

No clear indicator is presented. Much baseline research needs to be done to make this indicator globally relevant. Not a relevant indicator if 4.6.1 (all nets are washed at land based facilities with waste collection) is adhered to.

5.4.3 Presence of significantly reduced resistance in non-target organisms

-Not currently suitable for certification scheme.

-Much baseline research needs to be done to make this indicator globally relevant Find out if they mean 'resistance' or 'toxicity' (chronic/acute health effects).

5.5.3 % of marine-based feed ingredients that are screened for disease

-Not clear that any pathogen can survive feed manufacture process. Needs more research.

-Should be completed by feed manufacturer.

5.5.6 Number of smolt suppliers (per site)

The relevant concern is that the smolt supplier is certified with demonstrated bio-security and fish health protocols. Number of smolt suppliers/site not relevant.

December 15 2009

Marine Harvest Canada Technical Comments on SAD Draft Indicators (contacts Clare Backman and Sharon DeDominicis)

Principle	Criteria	Indicator	MHC Recommendation
Principle 1: Comply with all applicable international and national laws and local regulations.	1.1 Compliance with all applicable local, national and international legal requirements and regulations	N/a	Agree
Principle 2: Conserve natural habitat, local biodiversity and ecosystem function	2.1 Benthic biodiversity and benthic effects	2.1.1 Chemical indicator: Redox	Agree to redox. However discussion on threshold is warranted. Suggest that where additional environmental data is collected it is used to help interpret status of benthos. (Sulfide, TVS, SGS, visual).
		2.1.2 Faunal indicator: AMBI	Agree to this as a second tier step if sediment physicochemistry reveals an environmental concern. Alternatively, agree to sediment chemistry <b>or</b> biological sampling. Sediment chemistry works in countries where the surrogates have been adequately linked to the conditions of the benthic fauna. BC has substantial data validating chemical surrogates. Refer to Brooks paper that I sent Clare via email.
		2.1.3 Maximum levels of therapeutants and antibiotics in the sediment in the AZE.	This is primary research and should be approached as such. Recommend adding to roster once research has been completed. Divide into 2 categories: <ol style="list-style-type: none"> <li>1. Identify specific taxa of concern based upon bioassay work completed by pharmaceutical company. Select indicator taxa (example, commercial species, species at risk).</li> <li>2. Baseline monitoring of taxa and/or sediments to determine fate of chemical in environment (spatial, temporal and toxicity).</li> </ol>
	2.2 Water quality in and near site of operation	2.2.1 Dissolved oxygen levels on farm during grow-out	Agree to monitor but do not agree to a minimum DO threshold. BC is prone to very low natural DO due to upwellings and high ocean nutrients. We could agree to making sure that the DO draw down outside the cages in the general bay areas has not been significantly affected by the operation.

Principle	Criteria	Indicator	MHC Recommendation
		2.2.2 Freshwater: Phosphorus	Hatchery effluent – already regulated for phosphorus. We can agree to this. Lake effluent – non-point source and non-treated. This requires site-by-site environmental assessments to determine impacts of phosphorus to each individual lake. Recommend monitoring N-P ratio with Chlorophyll A as surrogate.
		2.2.3 Freshwater: Dissolved oxygen at the water-sediment interface	Not at the sediment-water interface – rather at about 1 meter from the bottom. Or at various depths throughout the water column (this is superior). An even better method is to monitor sediment physicochemical characteristics (SGS, TVS, Zinc, Phosphorus, Sulfide). This can be directly attributed to the farm effluent. Caution – this is more expensive than DO monitoring.
	2.3 Nutrient release from production	Measure % fines in feed	Agree. We already have SOPs in place to reject any feed with > 1% fines.
	2.4 Interaction with critical or sensitive habitats and species	Proximity to critical or sensitive habitat and mitigation	Agree to monitor critical habitat etc. as identified by the regulatory agencies of each country. Each country has clear siting rules to avoid such habitats/taxa – that need to be respected.
		Benthic chemical residues and potential impacts	This has been captured within Section 2.1.3.
	2.5 Interaction with wildlife including predators	2.5.1 Number of days where acoustic deterrent devices were used	Agree. There is nothing to measure in Canada as acoustic devices are not allowed.
		2.5.2 Number of marine mammals and birds killed (number of instances of lethal action taken).	Agree. This is already a regulatory requirement in Canada.
	2.6 Cumulative impacts on biodiversity (combined Criteria 2.6 and 2.7)	[2.6.1 Presence or absence of selected sensitive or sentinel species	A practical option is to monitor the benthos in nearby reference stations to track potential far-field changes. Sentinel species would need to be identified for each ecological niche. This is very ambitious and requires input from a team of ecological experts. If this will be required, recommend adding it in to future versions of the certification as more information becomes available.



Principle	Criteria	Indicator	MHC Recommendation
Principle 3: Protect the health and genetic integrity of wild populations	3.1 Introduced or amplified parasites and pathogens	3.1.1 Presence of clear documentation of disease occurrences/outbreaks on-farm.	Agree. Already a regulatory requirement.
		3.1.2 If non-endemic diseases and /or parasites are detected on farm, requirement to show through environmental testing that disease hasn't jumped into the wild and/or strong disease management practices through culling etc.	Agree to work with local authorities to determine origin of disease/parasite. Wild fish are the mandate of a much larger regulatory body – all assessments of this nature must be inclusive of stakeholders. <i>Scope much larger than aquaculture.</i>
		3.1.3 Re-occurrence of a specific disease over more than one generation (yes or no; or requirement to show through environmental testing that disease hasn't jumped into the wild).	Agree to work with local authorities to determine origin of disease/parasite. Wild fish are the mandate of a much larger regulatory body – all assessments of this nature must be inclusive of stakeholders. <i>Scope much larger than aquaculture.</i>
		3.1.4 Maximum on-farm lice levels (average of X lice per farmed fish)	Agree. We already have legalized thresholds.
		3.1.5 % of fish tested prior to transport.	Agree. Policies already in place.
		3.1.6 Method of transport of farm animals or other materials that reflects risks identified through pre-transport testing	Agree. Policies already in place.

Principle	Criteria	Indicator	MHC Recommendation
		3.1.7 Participation in an effective area-based disease management scheme	Agree to concept DO NOT agree to timeline. BC does not currently have area-based disease management schemes – this would need to be developed. <i>Diane needs to provide input here.</i>
		3.1.8 Infection pressure risk indicators, separate or combined into a single index	Limiting the density of fish on a farm and the density of farms in an area makes sense. However, what number are they thinking of? Buffer distance from salmon-bearing streams and migratory routes – agree to 1km buffer from <i>significant</i> streams. I don't know if this will work in Europe!
	3.2 Introduction of nonnative species	3.2.1 Will protect against exotic species becoming established	Agree to Option 3 - Allowing non-native species to be introduced to new geographies only if they are assessed to pose an acceptable level of risk.
	3.3 Introduction of transgenic species	3.3.1 Prohibit transgenic salmon on farm	
	3.4 Escapes	3.4.1 % of fish loss that is unexplained per unit time	Agree. Recognizing an acceptable error margin (variation) on accuracy of counts.
		3.4.2 Number and % of fish escaped per production cycle	Agree. Recognizing an acceptable error margin (variation) on accuracy of counts.
		3.4.3 Number of episodes of escapes per production cycle	Agree.
		3.4.4 Compliance with a formal plan to assess and mitigate escape risk that includes: # of netpen inspections per year and other elements.	Agree. SOPs already exist and we are regulated on this.
	3.5 Interaction with wild salmonid populations/runs	See indicators 3.1.7 and 3.1.8 above.	See answers above.

Principle	Criteria	Indicator	MHC Recommendation
Principle 4: Use resources in an environmentally efficient and responsible manner	4.1 Use of wild fish for feed	4.1.1 Forage Fish Efficiency Ratio (FFER), different for meal and oil.	Feed manufacturers responsibility.  MHC worst case scenario ratios = FFER 1.24 for protein, for fish oil assuming up to 13% inclusion the worst is 1.75.
	4.2 Source of marine raw materials	4.2.1: As of 2015, percentage of fisheries product (meal and oil) that are certified under an ISEAL Alliance-accredited scheme.	South American fish meal sources are all certified under the IFFO Global Standard. According to latest FAO figures 3 species used for fish meal production are fully exploited and fishery controlled by national governments. Whereby 'fully exploited' refers to sustainable levels.
	4.3 Source of non-marine raw materials in feed	4.3.1: Feed supplier must have a sustainability policy that, at a minimum, includes the ability to trace where their products came from, and complies with internationally recognized moratoriums and local laws.	Use of non marine raw materials in fish feed are governed by national laws in country of manufacture. Currently unaware of any certification on sustainability for vegetable crops but am aware of concerns that production of some feed crops is at the expense of deforestation. MH Canada aim is to minimize use of marine raw materials by substitution with Poultry By-product meal and oil and some vegetable alternatives.
	4.4 Non-biological waste from production	4.4.1 Existence of a functioning recycling policy	Under development. Some areas have logistical challenges finding depots to receive recyclable material (i.e. remote locations).
		4.4.2 % of plastics and other recyclable materials that are recycled or reused	This could be tracked. Currently isn't.
		4.4.3 Evidence that all non-biological waste that isn't recycled is disposed of properly	Disposal is according to landfill regulations at approved locations. This can be tracked.

Principle	Criteria	Indicator	MHC Recommendation
	4.5 Energy consumption and greenhouse gas emissions (on farm)	4.5.1. Records of energy consumption during hatchery, smolt production and grow-out (e.g. volume and type)	Tracking process currently being developed, currently waiting for new accounting program to help us track sites specific consumption; however we were able to calculate a the CEC for fuel, propane and electricity for 2008; the same will be for 2009. Our goal is to be capable of calculating emission reduction as a result of material recycled for 2010.
		4.5.2 Evidence of an energy use assessment for hatchery, smolt production and grow-out	Under development.
	4.6 Non-therapeutic chemical inputs	4.6.1 % of copper-treated nets that are cleaned and treated on land at site with effluent treatment	Agree. All our nets are washed on land at approved facilities that have strict effluent criteria. Agree to drop monitoring copper levels in indigenous fish – not relevant.
Principle 5: Manage disease and parasites in an environmentally responsible manner	5.1 Survival and health of farmed fish	5.1.1 Frequency of visits by a licensed veterinarian	Agree to track.
		5.1.2 % of fish that are vaccinated for selected diseases	Agree to track.
		5.1.3 % of mortality that is cause-specific	Agree to track mortalities in a systematic way.
		5.1.4 % of smolt tested for select diseases prior to entering grow-out phase (on farm)	Agree to track. SOPs already in place.
		5.1.5 Survival and/or mortality rate	Agree to track. SOPs already in place.
	5.2 Contamination levels and health effects in local non-target organisms	5.2.1 On-farm documentation requirement:	Agree to track. Fish health database SOPs already in place. Agree that environmental fate and potential affects on non-target organisms captured in 2.1.3 above.

Principle	Criteria	Indicator	MHC Recommendation
	5.3 Therapeutic treatments	5.3.1 Proof of proper dosing and/or concentrations for all antibiotics and therapeutants used, whether in feeds and in other treatments such as bath treatments.	Tracking appears redundant with 5.2.
	5.3.2 Banned substances	If using banned chemicals then site fails Criteria 1.1. Where drug companies are in the process of gaining approval in target markets (international concern) – a grace period needs to be granted.	
	5.3.3 Grams of active ingredient used per kilo fish produced	Agree to track.	
	5.3.4 % of medication events that are prescribed by a veterinarian	Agree to track.	
	5.3.5 Frequency of tissue residue violations		
	5.3.6 Minimum % of antimicrobial treatments that are applied because of a confirmed bacterial disease		
	5.4 Resistance of parasites, viruses, and bacteria to medicinal treatments	5.4.1 Participation in region-wide resistance monitoring programs	<p>Monitoring farmed fish health best indicator of therapeutant efficacy.</p> <p>Resistance monitoring programs currently at research stage for SLICE. Other medications unknown.</p> <p>More time required to transition from research stage to monitoring stage.</p>

Principle	Criteria	Indicator	MHC Recommendation
		5.4.2 Presence of significantly reduced sensitivity towards relevant therapeutants in target organisms	Same as above.
		5.4.3 Presences of significantly reduced resistance in non-target organisms	Pure research question. Not currently suitable for certification scheme. Find out if they mean 'resistance' or 'toxicity' (chronic/acute health effects).
	5.5 Biosecurity management	5.5.1 % of cages that are single year class (by farm? By region? % of cages owned by the same company as the site applying for certification?)	Start with % of sites stocked as single year class.
		5.5.2 Number of veterinarian visits per year	Same as 5.1.1.
		5.5.3 % of marine-based feed ingredients that are screened for disease	Scope issue. Should be completed by feed manufacturer.
		5.5.4 Risk index (NEED FORMULA FOR CALCULATION, see excel notes)??	
		5.5.6 Number of smolt suppliers (per site)	Relevant attribute is for supplier to be certified with demonstrated bio-security and fish health protocols. Number of smolt suppliers/site not relevant.

Principle	Criteria	Indicator	MHC Recommendation
Principle 6: Develop and operate farms in a socially responsible manner		6.1 Freedom of Association and Collective bargaining 6.2 Child Labor 6.3 Forced, Bonded, or Compulsory Labor 6.4 Discrimination 6.5 Health and Safety of workers 6.6 Wages 6.7 Contracts (Labor) including subcontracting 6.8 Conflict resolution	
Principle 7: Be a good neighbor and conscientious citizen	7.1 Interaction with local communities and other resource users		Clarification required: 1. To what level of inclusion? 2. All/some/one resource user? What is the scope? 3. Frequency of meetings and format?
	7.2 Respect for indigenous and aboriginal cultures and traditional territories		Clarification required: 1. To what level of inclusion? 2. How to demonstrate and measure 'respect' policy. Employment? Investment?

December 15 2009

Marine Harvest Canada Structural Comments on SAD Draft Indicators (contacts Clare Backman and Sharon DeDominicis)

November 2009 Draft SAD Principles & Criteria	MHC Comment
<p><b>Principle 1: Comply with all applicable international and national laws and local regulations</b></p> <p>Principle 1 is intended to ensure that all farms meeting the Salmon Aquaculture Dialogue standards meet their legal obligations as a baseline requirement.</p> <p>CRITERIA 1.1 Compliance with all applicable local, national and international legal requirements and regulations</p> <p>NOTES ON CRITERIA 1.1: Indicators related to legal compliance have not yet been discussed. For an example of how they have been addressed in other Dialogues, see the draft Bivalve Aquaculture Dialogue standards at <a href="http://www.worldwildlife.org/what/globalmarkets/aquaculture/WWFBinaryitem13945.pdf">http://www.worldwildlife.org/what/globalmarkets/aquaculture/WWFBinaryitem13945.pdf</a>.</p> <p><b>Principle 2: Conserve natural habitat, local biodiversity and ecosystem function</b></p> <p>Principle 2 is broadly intended to address potential impacts from salmon farms on natural habitat, local biodiversity, and ecosystem function. Specifically, the key impact areas of benthic impacts, effects of chemical inputs, effects of nutrient loading, and siting are addressed within this principle. (etc.)</p>	<p><b>Principle 1:</b> The approach used in the draft bivalve standard is appropriate, but we point out that what is listed there as a “Standard” actually reads more like a verifier (i.e., direction to the auditor on where to look for evidence of compliance). We raise this here because we have found throughout the draft SAD standard language at the level of the principle, criteria and indicator that does not meet the test of a) clarity, b) consistency and c) reliability. Our comments below address the use of language, and though we understand the Principles and Criteria have been approved by the SAD (following public consultation) where applicable we have suggested ways to improve the clarity of the P&amp;C. In a separate table we have commented on the technical aspects of the draft Indicators.</p> <p><b>Principle 2:</b> Beginning with <b>Criterion 2.1</b> and its indicator the Criterion does not provide clear intent and should be revised to say: <i>Conserve benthic biodiversity and maintain the health of benthic ecosystems</i>. This more clearly states the intent and provides a desired outcome. <b>Indicator 2.1.1</b> needs to state what is intended to be achieved, i.e. should “Redox potential and Sulphide levels” be maintained, reduced, measured, or what? <b>Indicator 2.1.2</b> also needs to provide intent, i.e. what’s supposed to be done? <b>Indicator 2.1.3</b> is getting better but needs clarity for instance reduce/eliminate maximum levels... By stating more clearly what the intent is within the indicator it will be much easier to develop quantitative measures (standard).</p> <p><b>Criterion 2.2</b> is vague and should be rewritten for instance “Maintain water quality in and near the site of operation within a range of natural variability.” If natural variability is the appropriate measure (it may be something else) then first indicator would be that the farmer has determined the baseline, i.e.</p>



	<p>natural variability. <b>Indicator 2.2.1, Indicator 2.2.2 and Indicator 2.2.3</b> do not provide intent. What is to be done measure, maintain, record, etc?</p> <p><b>Criterion 2.3</b> suffers from the same problem as the others above in that it doesn't state what the desired outcome should be. If the intent of the criterion is to minimize, control or eliminate nutrient release this should be stated in the criterion. If that was the case the first indicator would relate to evidence that the farmer can monitor and record nutrient release. A subsequent indicator would describe what the qualitative measure to be achieved should be, i.e. nutrient levels are maintained at ecosystem background levels. In this case the quantitative measure (standard) would have to be ecosystem specific.</p> <p><b>Criterion 2.4</b> should state desired outcome, i.e. "Conserve critical or sensitive habitats and species associated with farming operations." Again it's important to both state the outcome and the scope, you wouldn't for instance want to require that the farmer be responsible for habitat quality and species viability beyond the scale of the farm and its footprint. <b>Indicators 2.4.2, 2.4.3 and 2.4.4</b> are actually verifiers associated with <b>Indicator 2.4.1</b>. Again the quantitative measures (standards) will have to be ecosystem specific.</p> <p><b>Criterion 2.5</b> does not state the desired outcome and should be revised something along the following lines: "Manage Interaction with wildlife including predators to avoid harm to wildlife while protecting farmed fish and farm infrastructure." The first indicator would then relate to the farmer's program for managing interactions. <b>Indicators 2.5.1 and 2.5.2</b> are verifiers that need indicators. For instance the indicator relating to acoustic deterrents should provide parameters for their use.</p> <p><b>Criterion 2.6</b> is closely associated with <b>Criterion 2.4</b> and <b>Criterion 2.5</b> and drafters should consider combining so that sensitive species, critical habitats and predation are captured under a general criterion related to conserving biodiversity. If this is done the Criteria 2.4 and 2.5 could be revised to become indicators.</p>
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<p><b>Principle 3: Protect the health and genetic integrity of wild populations</b></p> <p>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. It addresses impacts associated with disease and parasites, escapes, and siting. <b>(etc.)</b></p> <p><b>Principle 4: Use resources in an environmentally efficient and responsible manner</b></p> <p>Principle 4 is broadly intended to address negative impacts that stem from resource use, including feed and non- therapeutic chemical inputs. <b>(etc.)</b></p> <p><b>Principle 5: Manage disease and parasites in an environmentally responsible manner</b></p>	<p><b>Principle 3:</b> By using the term “protect” in relation to health and genetic integrity (What does this mean?) of wild species the Principle potentially expands the responsibility of the farmer well beyond anything reasonable therefore indicators need to be very explicit. The criteria under this principle all suffer from the lack of a description of the desired outcome. Most of the indicators double as verifiers, begin to prescribe qualitative measures or are difficult to interpret, repeat or rely upon. A lot of work needs to be done here. In addition the qualitative measures (standards) for this Principle will need to be specific to regions or ecosystems.</p> <p><b>Principle 4:</b> Is clear and provides explicit direction. <b>Criterion 4.1</b> should provide a desired outcome, i.e. something about ensuring the use of wild fish in feed is sustainable. <b>Indicator 4.1.1</b> reads like a footnote and requires explicit statement of intent, i.e. FFER is calculated... <b>Criterion 4.2</b> does not provide a desired outcome. Is the intent that marine raw materials come from sustainable sources? This criterion requires an indicator that spells out what the farmer needs to do, i.e. documentation that traces to origin of marine raw material in feed. It appears that <b>Criterion 4.3</b> is very similar to <b>Criterion 4.2</b>. A single criterion related to the source of feed should be considered. <b>Criteria 4.4, 4.5 and 4.6</b> don’t seem to fit with <b>Principle 4</b> which is about the use of resources. Perhaps there is a need to craft a new principle to capture environmental parameters associated with energy consumption, non-biological waste, etc.</p> <p><b>Principle 5:</b> The Principle is clear, but the criteria and indicators require a fair bit of work to bring clarity of intent. Also the criteria under the Principle begins to address issues of husbandry confusing the issue of the integrated pest management for the purpose of reducing environmental impacts with the</p>
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Principle 5 aims to address negative impacts of salmon farming associated with disease, parasites and therapeutic chemical inputs. (etc.)	wellbeing of livestock. It would seem that the standard would benefit from a principle that addresses animal husbandry.
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15 December 2009

Ruth Salmon, Canadian Aquaculture Industry Alliance

Comments:

Principle	Criteria	Suggested Indicator	Canadian Industry Recommendation
Principle 1: Comply with all applicable international and national laws and local regulations.	1.2 Compliance with all applicable local, national and international legal requirements and regulations	N/A	<p>The Canadian industry notes that Principle 1 states that farming operations must “comply with all applicable legal requirements and regulations.” Canada, like many developed countries, has extensive laws, regulations and policies that address indicators in every area of the proposed standard. Thus, complying with Principle 1 means compliance with many of the indicators in other areas of the standard. It is important that WWF acknowledge that there are many different ways to achieve a desired outcome. Enabling companies to meet elements of the standard through compliance with government regulations and incorporating that concept into Principle 1 would do much to avoid duplication within the standard as well as the additional new costs imposed by this draft. This change would also help to address sovereignty issues that may arise as a result of conflicts between national laws and this standard. It would also address issues arising from jurisdictional imbalances across all the countries where this standard could be applied.</p> <p>The Canadian industry recommends that WWF add a sentence to Indicator</p>

			1.1 to read: “Where government legislation exists that regulates a farming operation in such a way that the desired outcome of a principle is met, that farming operation will be deemed to have met the standard of that principle.”
Principle 2: Conserve natural habitat, local biodiversity and ecosystem function	2.1 Benthic biodiversity and benthic effects	2.1.1 Chemical indicator: Redox	The Canadian industry recommends that sulfide be used as an indicator rather than redox. If redox remains an indicator, results should be evaluated using a collection of parameters (sulfide, TVS, visual). Further discussion on thresholds is also required.  Where additional environmental data and information is collected, it should also be used to help interpret status of benthos. (Sulfide, TVS, SGS, visual).
		2.1.2 Faunal indicator: AMBI	The Canadian industry would support indicator as a second tier step, if sediment physicochemistry reveals an environmental concern. Alternatively, the option should be provided of using either sediment chemistry <b>or</b> biological sampling. Sediment physicochemistry has been scientifically shown to be an acceptable surrogate for the conditions of the benthic fauna. Biological sampling is highly expensive, with costs up to \$10,000 per farm per audit.
		2.1.3 Maximum levels of therapeutants and antibiotics in the sediment in the AZE.	The Canadian industry recommends indicator 2.1.3 be considered for inclusion only after primary research on this subject has been completed. This indicator should be divided into two categories: <ul style="list-style-type: none"> <li>3. Identifying specific taxa of concern based upon bioassay work completed by the pharmaceutical company. Then selecting an indicator taxa (i.e. commercial species, species at risk) to be measured.</li> <li>4. Baseline monitoring of taxa and/or sediments to determine fate of chemicals in environment (spatial, temporal and toxicity).</li> </ul> It should be noted that sediment testing is very expensive. Costs are approximately \$2000/farm/audit.

			Further, consideration of this indicator must include provisions for testing only if specific therapeutants have been used on the farm during the production cycle being audited. Because of costs, there should be a multi-tier sampling matrix where additional sampling is completed only where warranted.
	2.2 Water quality in and near site of operation	2.2.1 Dissolved oxygen levels on farm during grow-out	The Canadian industry supports monitoring of dissolved oxygen (DO) levels, but we do not agree to a minimum DO threshold. It is very common in coastal waters of Canada to have very low DO levels due to upwellings and high ocean nutrients,
		2.2.2 Freshwater: Phosphorus	Hatchery effluent to streams and rivers is already monitored and regulated in Canada for phosphorus. Effluent to lake environments requires a site-by-site environmental assessment to determine the potential impacts of phosphorus on each individual lake. The Canadian industry recommends monitoring the N-P ratio with Chlorophyll A as surrogate.
		2.2.3 Freshwater: Dissolved oxygen at the water-sediment interface	<p>The Canadian industry does not feel DO should be measured at the sediment-water interface. Instead it should be measured one meter from the bottom, or at various depths throughout the water column.</p> <p>Alternatively, sediment physicochemical characteristics (SGS, TVS, Zinc, Phosphorus, sulfide) can be monitored, as they can be directly attributed to the farm effluent. One caution is that this method is more expensive than DO monitoring.</p> <p>The spatial and temporal limitations to these impacts will need to be considered given open net pen operations can not realistically meet a standard of “no measurable change”.</p>

	2.4 Interaction with critical or sensitive habitats and species	Proximity to critical or sensitive habitat and mitigation	Each country has clear siting rules to avoid sensitive habitats/taxa. This needs to be respected. Please refer to comments regarding Principle 1.
		Benthic chemical residues and potential impacts	This indicator has been captured within Section 2.1.3.
	2.6 Cumulative impacts on biodiversity (combined Criteria 2.6 and 2.7)	2.6.1 Presence or absence of selected sensitive or sentinel species	The Canadian industry acknowledges that assessment of potential cumulative impacts is important. However, consideration of this indicator must recognize that sentinel species would need to be identified for each ecological niche, requiring input from a team of ecological experts. Similarly, monitoring the benthos in nearby reference stations to track potential far-field changes requires careful scientific and region specific input. The Canadian industry recommends adding this indicator to future versions of the standard as more information becomes available.
Principle 3: Protect the health and genetic integrity of wild populations	3.1 Introduced or amplified parasites and pathogens	3.1.1 Presence of clear documentation of disease occurrences/outbreaks on-farm.	What constitutes an 'outbreak' needs to be clearly defined.

		<p>3.1.2 If non-endemic diseases and /or parasites are detected on farm, requirement to show through environmental testing that disease hasn't jumped into the wild and/or strong disease management practices through culling etc.</p>	<p>The Canadian industry agrees that the origin of disease/parasites need to be determined. However, wild fish are the mandate of a much larger regulatory body and assessments of this nature must be inclusive of all stakeholders. The scope of this indicator is much larger than aquaculture.</p> <p>Since regulations require fish to be screened for pathogens prior to transfer to sea pens, the presence of disease on farms is most likely a result of the pathogen having been acquired from the surrounding environment. Farms do not have legal authority to screen fish outside their pens, therefore it is unreasonable for farms to be asked to shoulder the cost and the responsibility for screening wild stock</p>
		<p>3.1.3 Re-occurrence of a specific disease over more than one generation (yes or no; or requirement to show through environmental testing that disease hasn't jumped into the wild).</p>	<p><i>The Canadian industry is unclear on the objective of this statement. Does it mean amplification of diseases/parasites at farms?</i></p> <p>As above, the Canadian industry agrees that the origin of disease/parasite needs to be determined. However, wild fish are the mandate of a much larger regulatory body and assessments of this nature must be inclusive of stakeholders. The scope of this indicator is much larger than aquaculture.</p>
		<p>3.1.4 Maximum on-farm lice levels (average of X lice per farmed fish)</p>	<p>The Canadian industry feels the proposed standards must allow for flexibility regarding on-farm lice thresholds. The development of treatment triggers for sea lice should consider, among other things, the ecosystem within which the farm is operated, the time of year, and the presence/absence of vulnerable wild fish stocks. In some jurisdictions it will make sense to have a trigger, in others it will not. This understanding and flexibility must to be incorporated into the standard.</p>
		<p>3.1.6 Method of transport of farm animals or other materials that reflects risks</p>	<p>The Canadian industry agrees to this indicator but the standard should follow the regulation of each country. Please refer to comments regarding Principle 1.</p>

		identified through pre-transport testing	
		3.1.7 Participation in an effective area-based disease management scheme	The Canadian industry supports the concept of area based programs where they are appropriate and ecosystem based.
		3.1.8 Infection pressure risk indicators, separate or combined into a single index	<p>The Canadian industry agrees that limiting the density of fish on a farm and the density of farms is an important consideration. However, what density limit is being considered for this indicator?</p> <p>Establishment of a minimum separation distance from salmon bearing streams must be done in accordance with regional or site specific regulations or policies (link to 1.1 – compliance with applicable legal siting requirements), and must consider the risk-based mitigation employed by the farm.</p>
	3.2 Introduction of nonnative species	3.2.1 Will protect against exotic species becoming established	<p>The Canadian industry agrees to the second option - Allowing non-native species to be introduced to new geographies only if they are assessed to pose an acceptable level of risk.</p> <p>The definition of acceptable risk must be defined or else must be taken as 'Approval by a Competent Government Authority'. (e.g. Fisheries and Oceans Canada). If approved, then the risk is considered acceptable; if not approved, then the risk is unacceptable.</p>
	3.4 Escapes	3.4.1 % of fish loss that is unexplained per unit time	The Canadian industry agrees, however there needs to be an acceptable error margin (variation) on accuracy of counts.
		3.4.2 Number and % of fish	The Canadian industry agrees, however there needs to be an acceptable



		escaped per production cycle	error margin (variation) on accuracy of counts.	
	3.5 Interaction with wild salmonid populations/runs	See indicators 3.1.7 and 3.1.8 above.	See answers above.	
Principle 4: Use resources in an environmentally efficient and responsible manner	4.1 Use of wild fish for feed	4.1.1 Forage Fish Efficiency Ratio (FFER), different for meal and oil.	This indicator was the focus of much discussion at the meeting in Bergen. It is the opinion of the Canadian industry that further work is required before it could be used in the standard.	
	4.2 Source of marine raw materials	4.2.1: As of 2015, percentage of fisheries product (meal and oil) that are certified under an ISEAL Alliance-accredited scheme.	South American fish meal sources are all certified under the IFFO Global Standard.	
	4.3 Source of non-marine raw materials in feed	4.3.1: Feed supplier must have a sustainability policy that, at a minimum, includes the ability to trace where their products came from, and complies with internationally recognized moratoriums and local laws.	The use of non marine raw materials in fish feed is governed by national laws in the country of manufacture. The Canadian industry is currently unaware of any certification on sustainability of vegetable crops. However, we are aware of concerns that production of some feed crops is at the expense of deforestation.	
	4.4 Non-biological waste from production	4.4.1 Existence of a functioning recycling policy		There remains some remote areas in Canada which still have logistical challenges in finding depots to receive recyclable material.
		4.4.3 Evidence that all non-biological waste that isn't recycled is disposed of		In Canada, disposal is according to landfill regulations at approved locations.

		properly	
	4.6 Energy consumption and greenhouse gas emissions (on farm)	4.5.1. Records of energy consumption during hatchery, smolt production and grow-out (e.g. volume and type)	The Canadian industry agrees. Tracking programs for site specific energy consumption and emission reduction are currently being developed in Canada.
		4.5.2 Evidence of an energy use assessment for hatchery, smolt production and grow-out	This indicator has potential, and would be valuable, pending identification of appropriate methodology.
		4.6.2 Measuring copper in sediments	Near field copper levels are nearly always elevated above background levels where copper antifoulants are used. Therefore the threshold of 'no measurable change from background' is unrealistic. A change from background does not necessarily represent a real or potential environmental concern, particularly as the bio-availability of copper depends to a large degree on associated organic carbon levels. Further, as sediments may be highly mobile and metal concentrations come from many different sources (including geological erosion), background levels may be highly variable. The Canadian industry asks that the sampling for this indicator occur 100m from the net pen arrays, that it consider other related parameters and the standard reflect known scientific toxicity information, and that variations in background levels are taken into account.
		4.6.3 and 4.6.4 Copper and zinc in non-target organisms	The Canadian industry feels this indicator requires more research. There also needs to be a separation between motile and sessile taxa: <ol style="list-style-type: none"> <li>1. Motile taxa should not be used as an indicator as it is impossible to control where they have been during their multi-year life spans.</li> <li>2. Sessile taxa is an environmental concern, however, the sulfide toxicity and anoxic conditions beneath the farm affect the sessile</li> </ol>

			<p>taxa long before copper becomes an issue. The main question should be whether copper sedimentation is an issue at the 100m range from the cage array.</p>
Principle 5: Manage disease and parasites in an environmentally responsible manner	5.1 Survival and health of farmed fish	5.1.4 % of smolt tested for select diseases prior to entering grow-out phase (on farm)	The Canadian industry agrees, however, a reasonable % sample needs to be determined as testing could get very expensive.
	5.2 Contamination levels and health effects in local non-target organisms	5.2.1 On-farm documentation requirement:	The Canadian industry agrees that environmental fate and potential effects on non-target organisms are captured in 2.1.3 above.
	5.3 Therapeutic treatments	5.3.1 Proof of proper dosing and/or concentrations for all antibiotics and therapeutants used, whether in feeds and in other treatments such as bath treatments.	<p>This indicator is redundant with indicator 5.2.</p> <p>Audits should occur at the end of a production cycle and not mid-cycle. The point is to certify each crop of fish; therefore it's essential to look at the entire production cycle, not just a seemingly random point in time.</p>
		5.3.2 Banned substances	This indicator is duplication - if a site is using banned chemicals, then it fails Principle 1. Where drug companies are in the process of gaining approval in target markets (international concern), a grace period needs to be granted.
	5.4 Resistance of parasites, viruses, and bacteria to	5.4.1 Participation in region-wide resistance monitoring programs	Monitoring farmed fish health is the best indicator of therapeutant efficacy. Area-based standards will hold a single farm responsible for establishing a

	medicinal treatments		system that is outside of their scope of influence. Such area-based approaches are the responsibility of the jurisdictional authority
		5.4.2 Presence of significantly reduced sensitivity towards relevant therapeutants in target organisms	Monitoring farmed fish health is the best indicator of therapeutant efficacy. Resistance monitoring programs are currently at the research stage in Canada. More time is required to transition from the research stage to the monitoring stage.
		5.4.3 Presences of significantly reduced resistance in non-target organisms	The Canadian industry is unclear with what this indicator is trying to achieve. Is the meaning 'resistance' or 'toxicity' (chronic/acute health effects).  This indicator is a research question, and not currently suitable for a certification scheme.
	5.5 Biosecurity management	5.5.1 % of cages that are single year class (by farm? By region? % of cages owned by the same company as the site applying for certification?)	The Canadian industry would like to use “% of sites stocked as single year class” as the indicator.
		5.5.2 Number of veterinarian visits per year	This indicator is a duplication of indicator 5.1.1.
		5.5.3 % of marine-based feed ingredients that are screened for disease	This indicator is beyond the scope of aquaculture companies. It should be completed by the feed manufacturer.
		5.5.6 Number of smolt suppliers (per site)	The number of smolt suppliers per site is not relevant. The important attribute is for the supplier to be certified with demonstrated bio-security and fish health protocols.

Principle 7: Be a good neighbor and conscientious citizen	7.1 Interaction with local communities and other resource users		This indicator requires further clarification: 4. To what level of inclusion? 5. Which resource users (all/some/one)? What is the scope? 6. What is required frequency and format of meetings?
	7.2 Respect for indigenous and aboriginal cultures and traditional territories		This indicator requires further clarification: 3. To what level of inclusion? 4. How is a 'respect' policy demonstrated and measured? 5. What about employment? Investment?

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14 December 2009

EWOS Group (contacts Ian Carr and Viv Crampton)

EWOS Comments to SAD Draft Indicators (Version dated: 2<sup>nd</sup> November 2009)

In this document we have focussed our comments and proposals on the indicators related to feed and feed management.

Principle	Criteria	Indicator	Comment	Proposal
2	2.3	2.3.1	Definition of 'fines in the feed'? Some pellets may be broken (for example due to handling in the feeding system) but that does not necessarily mean that they are not eaten by fish.	FCR (Feed Conversion Rate) may be a better indicator to address this criterion (nutrient release from production)?

Principle	Criteria	Indicator	Comment	Proposal
4	4.1	4.1.1	<p>FFER is not an appropriate indicator for the efficient use of wild fish resources, because it is not stable with the yield of fat from 'forage fish'. Therefore, in the case of salmon farming, a performance measure based on FFER could in fact cause over-exploitation of high-fat forage fish, with a consequent adverse impact on biodiversity. For more details on this, please see this attachment:</p> <p> Nutrient Ratios 1</p>	<p>Replace with an indicator based on nutrient dependency (i.e. protein and fat). Change indicator text to: <i>"Nutrient dependency ratios calculated separately for marine protein (MPDR) and marine oil (MODR)"</i> We have previously (07/10/09) given details of the formulas (MPDR and MODR) in this submission to the Feed SWG (see p.6 and p.7 of attachment):</p> <p> Alternatives to FI/FO</p> <p>Note: If FFER must be retained as an indicator for political reasons, then we propose that it should only be in addition to nutrient based indicators.</p>
4	4.2	4.2.1a	We see no good reason for limiting the certification of raw material sources only to ISEAL Alliance accredited schemes.	<p>Raw material sources certified under ISO65 compliant schemes should also be accepted. E.g. IFFO Responsible Supply scheme. Change indicator text to: <i>"The percentage of fisheries product (meal and oil) in feed that is certified under an ISEAL Alliance accredited scheme or an ISO65 based scheme"</i></p>
4	4.2	4.2.1b	If changes are made to 4.2.1a as we propose, then 4.2.1b becomes redundant.	Remove indicator
4	4.3	4.3.1	We see no good reason for limiting the certification of raw material sources only to ISEAL Alliance accredited schemes.	-
4	4.4	-	Missing an indicator for waste reduction.	Add indicator text: <i>"Amount of non-biological waste produced per unit of production"</i>

Principle	Criteria	Indicator	Comment	Proposal
4	4.5	-	Missing an indicator for GHG emissions	Add indicator text: <i>"GHG emissions per unit of production"</i>
5	5.1	-	Missing an indicator for preventative health practices	Add indicator text: <i>"Evidence of preventative health management plan covering: risk assessment; non-therapeutic measures (e.g. functional feeds); and therapeutic measures (e.g. medicines)"</i>
5	5.5	5.5.3	This is a food safety issue rather than an environmental impact	Remove indicator

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