

Monterey Bay Aquarium Seafood Watch®

Seafood Watch® Criteria for Aquaculture

Summary of comments from Public Consultation 1 and Responses

Preamble

Seafood Watch assesses the sustainability of fisheries and aquaculture by compiling relevant science-based information and evaluating that information against our standards (called 'Criteria' elsewhere on this website). We periodically revise our standards to ensure we account for developments in the scientific understanding of the ecological impacts of fisheries and aquaculture operations, as well as in our understanding of what producers and managers can do to mitigate those impacts. Seafood Watch initiated a public comment period from October 27, 2014 to January 16, 2015 and received comments from ENGO's, producers, certification schemes, and other interested stakeholders.

The comments received have been grouped together by similar themes or by criterion and are presented in "**bold**". Seafood Watch has carefully considered all comments received in addition to reviewing many of them with a Technical Advisory Committee. Below we present our responses to all comments received as part of the official Public Comment Period as per the requirements of the ISEAL Code of Good Practice Standards-Setting Code¹.

Context and terrestrial comparisons

1. **"Aquaculture context: Address comparisons between marine and terrestrial protein sourcing (SFW red is still often a better choice than beef, pork, or chicken). In chemical use (typically less than terrestrial agriculture), feed criterion (more efficient than beef), etc. Seafood Watch should consider making all reports default yellow or give 'environmental credits' when compared to other terrestrial agricultural or wild fisheries production methods"**

- We appreciate this comment and are well aware of the concern and the challenge of making this comparison. As such, Monterey Bay Aquarium does raise the issues during special events and outreach to stakeholders. It is important to note,

¹ <http://www.isealalliance.org/our-work/defining-credibility/codes-of-good-practice/standard-setting-code>

however, that the methodology enlisted by Seafood Watch to generate seafood recommendations is that of assessing an aquaculture operation specifically against our sustainability criteria. The methodology does not compare aquaculture operations against other types or industries.

2. “The Criteria only look at potential negative impacts and give no recognition for aspects of aquaculture that may be an environmental credit compared to other food production, i.e. differences in water usage”

- The methodology enlisted by Seafood Watch to generate seafood recommendations is that of assessing an aquaculture operation specifically against our sustainability criteria. The methodology does not compare aquaculture operations against other types or industries.

3. “Seafood Watch is becoming a pseudo-certification or alternative-to-certification scheme. The consequences of SFW continuing its current pseudo-certification trajectory includes potential credibility-damaging criticism leveraged from the industry, as well as devaluing certification and its role in aquaculture improvement”

- Seafood Watch is not a voluntary eco-certification program, which is structured to recognize only responsible or sustainable performers. Seafood Watch performs involuntary assessments to identify the environmental performance of fisheries and aquaculture operations supplying the North American marketplace and discloses their rating along a spectrum of sustainability from worst to best. As such, the program plays an important and different role from that of eco-certification.
- Seafood Watch works closely with multiple eco-certification groups to strengthen and improve certification standards, and we view ourselves as working in harmony, not competing, with eco-certification groups in the marketplace. For example, see our eco-certification benchmarking work and deferrals at <http://www.seafoodwatch.org/seafood-recommendations/eco-certification>

4. “How do we address traceability; i.e. feed ingredients. (without it, we don’t have anything)”

- Seafood Watch criteria do not include traceability as a measure of environmental performance. Monterey Bay Aquarium does, however, work to inform improvements in seafood traceability through existing efforts with regulatory bodies (e.g. the National Ocean Council’s traceability program), our business partners, and the supply chain. .

5. “Should Seafood Watch create a checklist type of format?”

- While our current intentions are not for Seafood Watch to be a third party auditable standard, we are considering how to make the Criteria more user-friendly for producers, which we believe will foster improvement of practices. This exercise is outside the scope of this criteria revision process however it is being actively explored.

6. **“Need to encourage best practices AND actively recognize/reward individual farmers. Also in the same vein: Regional & country-level assessments run the risk of generalizing a range of farm impact-levels within a given area.”**
- We understand this challenge, but our scope starts by identifying the ‘typical’ farm to assess the majority of an industry. This is our approach because assessing every farm in a geographic region is impossible, and our goal is to bring useable information to our buying partners whose supply chains are often large and complex. We recognize the importance of encouraging best practices and believe the “Best Choice” ranking offers the opportunity for innovators to do this. We have an option in our program called an “External Assessment” which provides an opportunity for individual farmers to volunteer themselves for an assessment if they believe that a large-scale assessment of their geographic area does not accurately describe their production practices.
7. **“SFW needs to become less US-centric and highlight best players/systems/companies instead of poor performers; especially in developing industries.”**
- We understand this critique and it is important to note that we strive to review seafood products that are relevant to the North American market. Because more than 90 percent of seafood is imported into the United States alone, this means the vast majority of our assessments are of fisheries and aquaculture operations outside of the US. As such, our Criteria are indeed applicable to any farm (or fishery) anywhere in the world.
 - Assessments are prioritized based on the presence of the product in the North American market. Seafood Watch does not actively seek out better or worse performers to assess, but are open to doing so based on the priorities of our business partners². The Seafood Watch “External Assessment” program allows better performers to identify themselves so an assessment done that is specific to their production system can be undertaken; this can, if evidence supports, result in specific producers to score higher than the large-scale assessment of their region.
8. **“Methodology is too granular, reading more like certification Criteria than is appropriate for the type of assessment SFW performs”**
- The Seafood Watch Criteria are a reflection of what we believe we need to assess in order to provide robust recommendations to consumers and our business partners.
9. **“Criteria are overly complex and need some simplification”**
- The Criteria are complex because they must be applicable to all aquaculture species and production systems at all scales (individual farms, regional, national, and international industries). Our Criteria are thorough, and a reflection of what we believe we need to assess in order to provide robust recommendations to consumers and our partners.

² <http://www.seafoodwatch.org/businesses-and-organizations/partners>

10. “Methodology is too specific for like-to-like comparisons between reports”

- We use the same Criteria for all aquaculture assessments. As such, it is possible to compare assessments on a “like-to-like” basis.

Other

11. “This definition of *aquaculture* is poor. A better definition is “the cultivation of aquatic animals and plants in natural or controlled marine or freshwater environments”.

- Current definition: “Aquaculture is the process of converting resources from one form to another more desirable form via aquatic animals and plants.”
- Our current definition of aquaculture is intended to highlight the importance of efficiency of conversion of resources used to produce farmed aquatic animals and plants. The end product may be more desirable than the raw resources economically, however there are environmental costs associated with this conversion, as well as complex social and economic costs and benefits. The environmental impact of this conversion is the basis for all Seafood Watch aquaculture assessments, and is the reason for the wording of our definition of aquaculture.

12. “In ‘*sustainable seafood*’ definition, using the word ‘*maintain*’ confuses wild fisheries & aquaculture. Aquaculture is the seafood production system of the future and the SFW system needs to be recalibrated to recognize the world’s need for more seafood as well as ocean conservation.”

- Seafood Watch defines “sustainable seafood” as seafood from sources, whether fished or farmed, that can maintain or increase production without jeopardizing the structure and function of affected ecosystems.

13. “Original text: “Overall, maximizing the social and economic benefits of aquaculture continues to be the driver for, and focus of, both subsistence and industrial production.” Is maximizing social and economic benefits really a driver for subsistence production?”

- This statement is made in the context of explaining why Seafood Watch focuses on environmental issues. Environmental conservation is often not a high concern for subsistence aquaculture, which has the immediate goal of providing a food source to a population whose nutritional needs would not be met without it, and whose economy relies on it. Environmental conservation is secondary to these basic needs, and is therefore often overlooked.

14. “Greater importance should be given to regulatory management effectiveness throughout all criteria. SFW should also consider aquaculture industry’s compatibility with local policies, land use, use of public waters”

- Seafood Watch has had a management criterion in the past, but given that aquaculture management systems are generally much less developed than fisheries management systems, credibly evaluating the strength of the management measures themselves is challenging. As a result, Seafood Watch does not

automatically defer to regulation and management, as it may not be an appropriate option for assessing ecological impact from aquaculture. We have regulatory management options included in the Chemical, Disease, Escapes, and Wildlife criterion tables, and have also added an 'illegal' component in multiple criteria (Effluent, Habitat, Chemical, Feed).

- We understand that regulation and management measures are implemented differently at various scales of management due to a variety of enforcement, political, and financial capacity factors. We have addressed this in the revised Criteria.

15. "As stated throughout, it is imperative that SFW assessments are conducted objectively. While precaution is necessary, it must have scientific basis. It should not be used as a shield to avoid controversy. Scoring should be based on fact. Current data and historical trends inform analysts; analysts should not be making hypothetical projections that are not justified by the data."

- We agree, and our approach has always been to make assessments based on the best available science. Given our existence as a conservation organization, we must default to the 'precautionary approach' when there is a lack of robust data or inconclusive research regarding the current status of the industry being assessed.

16. "There are 11 objectives in 2014 guiding principles, only 10 are present now; was something omitted?"

- The impacts of greenhouse gas emissions will be incorporated in the revised Criteria.

17. "We believe that each farm is a direct impact upon the natural conditions of the marine environment and such should either not be allowed or should provide for appropriate level mitigation to offset the loss of diversity"

- The Habitat Criterion assesses the loss of ecosystem services due to conversion of habitat for aquaculture. It is not the assumption of Seafood Watch that all conversion of habitat will necessarily lead to a loss of biodiversity. While some individual organisms in a population may be lost, Seafood Watch assesses the population-level impact from this conversion and loss, rather than direct impact to individuals. In this way, the Habitat Criterion scores higher for aquaculture sited in areas that have low biodiversity (fewer ecosystem services to be disrupted) and lower in areas of high biodiversity (more ecosystem services can be disrupted).
- Restoration is included in the management section of the Habitat Criterion as a way to increase the score if it can be demonstrated to be effective; however, it is not a requirement that losses be mitigated by restoration in order to achieve a high score for either the Habitat Criterion or the final rating. It is not our view that all ecosystems have the same biodiversity or that their conversion necessarily results in population-level impacts or broad loss of ecosystem services.

18. “I do not believe your review Criteria is specific enough in regards to impacts upon important habitat, use of chemicals (pesticides, herbicides), genetic modification of species farmed, and use of non-native species”

- The Criteria has been developed in a way that can be applied to all species, scales, and production systems. Due to this scope, it is not possible to specify limits of chemicals, or acceptable species for farming (to address the non-native issue raised in the above comment). The siting of farms in critical and high-value habitats is addressed in Factor 3.1 of the Habitat Criterion, and impacts of genetic variance of escaped farmed fish from native, wild populations are addressed in Factor 6.2 of the Escapes Criterion.
- Currently, Seafood Watch does not hold a specific position with regard to GMO fish production.

19. “Remove requirement for English-language info if Seafood Watch are going global (Brazil office will be looking for imports to Brazil...)”

- This has been corrected in the revised version.

Scope

20. “Assess by ‘zones’ of production rather than individual or national scales”

- Area-based management has been included in the revised Criteria within the Effluent and Habitat criteria to highlight the benefits of this scale of management. While the overall scope of a report may not reflect the area-based management boundaries, management sections within the criterion are assessed using area-based management as the highest bar.

21. “Seafood Watch reports generally overlook cumulative impacts frequently. Recommendations should be regional and based on level of cumulative impact - EAP is good for steering, but even these farms contribute cumulatively

- It is the intent of Seafood Watch that all assessments, regardless of scale, address impacts within each criterion in the cumulative and population-level sense. New language has been added to the revised Criteria to address this point more directly, both in the Introduction to cover all criteria and within specific criteria where this guidance is specifically needed.

22. “Farm level assessments should only be conducted in the absence of cumulative impacts. Where cumulative impacts occur, farms should be assessed based on the area of impact (for relevant Criteria).”

- Farm level assessments that are done using the Seafood Watch Criteria account for the potential contribution of the farm being assessed to the industry’s cumulative impacts. We have added guidance for explicitly requiring consideration of cumulative impacts in farm-level assessments that states: “Farm-level assessment must include their relative contributions to the cumulative impacts of neighboring farms and the larger scale industry.”

Illegal & social considerations

23. “No illegal/social criterion”

- In a variety of criteria where it is most applicable (i.e. Effluent, Habitat, Chemicals, Feed, Wildlife interactions), we have proposed assessing the presence of illegal activity as yielding a low score “avoid” , but not Critical unless data indicates that activity results in significant ecological impacts. We have also added more details on illegal activities including:
 - Illegal dumping (Effluent Criterion)
 - Destroying protected areas; MPAs (Habitat Criterion)
 - Illegal chemical use (Chemical Criterion)
 - IUU fisheries (Critical in Feed Criterion)
 - Killing protected species (Wildlife Interactions Criterion)
- For social issues, we recognize that this is a critical issue that is growing in importance. We are considering use of third-party criteria and/or building in the most obvious social abuses into our Criteria.

Data Criterion

24. “Critically low data availability score should trigger an overall red recommendation”

- The Criteria have been developed in a way that allows an assessment to be done based on risk in the absence of full data availability. While it is preferable to have high quality data to inform an assessment, options for “evidence-based” and “risk-based” assessments have been built into multiple criteria, as well as scoring options for “unknown” impacts (which are Red). In factors where one of these two options has not been offered, the criterion has been built using a structure to develop proxies for environmental impact based on openness of the production system. Each criterion is intended to be able to assess an aquaculture operation’s ecological impacts, regardless of the amount or quality of data.
- We have proposed the addition of the Data Criterion to the Decision Rules for final rankings, which translates practically to a low/Red Data score for an assessment counting toward the final number of Red criterions. Currently, it does not count toward the Decision Rules.

25. “Data availability does not affect either environmental risk or impact; should be a separate confidence interval”

- Given that aquaculture operations operate in the public commons, it is important that the ecological impacts of operations are understood. Data availability is a key metric of that.

26. “Uncertainty should weigh more heavily in your evaluations. Each criterion score would be based on the level of certainty”

- We are proposing the addition of *unknown* scoring options (as Red scores) within multiple criteria to highlight the level of risk associated with unknown information and adhere to a precautionary principle.
- We are not proposing to put a scoring cap on individual criteria based on data availability because we do not want to penalize an assessment twice for the same impact (i.e. once in Criterion 1 – Data and again by capping a criterion score).

27. “Inherent bias in reports (i.e. Evidence-based effluent data biased towards critical impacts; wildlife criterion biased towards high-status species, etc.).”

- As a conservation organization, it is the mission of the Monterey Bay Aquarium and Seafood Watch to “Inspire Conservation of the Oceans” and therefore our focus is on conservation. Our criteria have been developed with thorough reference to the environmental impact literature and references can be found in the criteria document itself.

28. “Apply data scores to individual criteria (credits, caps, multipliers)”

- We are proposing the addition of *unknown* scoring options (as Red scores) within multiple criteria to highlight the level of risk associated with unknown information and adhere to a precautionary principle.
- We are not proposing to put a scoring cap on individual criterion based on data availability because we do not want to penalize an assessment twice for the same impact (i.e. once in Criterion 1 – Data and again by capping a criterion score).

29. “Level of data required changes based on the scale of the assessment”

- Data availability tends to be higher as the scope of an assessment becomes smaller. Data can be more directly applicable to the assessed area with a smaller scale assessment, however data on large-scale impacts (cumulative, population-level etc.) from small-scale farms is generally just as difficult to find as it is for large-scale assessments.

30. “Specifically evaluate the detail, accuracy and validity of data (i.e. environmental data on which regulations are based).”

- This is reflected in the Data Criterion
- We are proposing new language in the Criteria to address the issue of environmental regulations based on policy rather than ecological studies. Seafood Watch avoids deferral to regulation where possible because it is understood that regulations do not necessarily adequately protect and/or conserve sites or environments in which aquaculture operations are sited.

31. “Make all recommendation data public (both private and public data); as a living database (contributable by industry). Increased transparency in both the review process and with general timelines would add value to the program.”

- All interpretations of data (i.e. our assessment reports) used by Seafood Watch are publicly available at www.seafoodwatch.org. There are no Seafood Watch reports that have used private data that cannot be cited as justification for a score.

32. “It is critically important to incorporate local knowledge and an understanding of the specific system in which the farming activities are taking place”

- We currently do this to the best of our ability in desktop analysis. A thorough review of peer-reviewed literature and grey literature is conducted, as well as contact and input from experts in academia, government, conservation, and industry to inform the assessment and provide data and peer review of draft assessments.

33. “Remove ‘other’ category”

- Removed in the revised Criteria.

34. “Include explicit reference to ‘publicly available’ data in the requirements for mod high/high data quality”

- All interpretations of data (i.e. our assessment reports) used by Seafood Watch are publicly available. There are no Seafood Watch reports that have used private data that cannot be cited as justification for a score.

Effluent Criterion

35. “Risk-based data can have a high level of aggregation and variability (average of averages)”

- We understand this challenge and evaluate data quality in every assessment.

36. “Simplify the criterion by analyzing production and feed quantities to calculate total N, C, and P discharges. Since impacts from these discharges are well known, focus more on how farmers are reducing these loads (i.e. technology). Or conversely, focus on general waste release by production type, regulation, and literature review records of pollution issues”

- We appreciate this suggestion, but the suggested approach does not address cumulative impacts and, as has been communicated, is a concern. We have already integrated the suggested options regarding general waste release.

37. “Incorporate carrying capacity of receiving waterbody into calculating level of environmental impact”

- Seafood Watch does not have the capacity to carry out comprehensive studies of ecological carrying capacity for each region assessed. However the Evidence-Based Assessment approach is based on data showing any impacts to the waterbody at the cumulative level. The Risk-Based Assessment includes a section assessing the strength of management measures in place to regulate effluent discharges into the waterbody. If limits are unknown, or are not based on the carrying capacity of the receiving waterbody, the score will be low.

38. “Include specific data requirements in each level of the evidence-based assessment table (dissolved oxygen, sulphide levels, TSS, P or N levels, etc.)”

- The Effluent Criterion implies that these will be used if available, but we avoid including specific limits due to the variety of ecosystems, production systems, and species that we assess.

39. “Include management effectiveness requirements in each level of the evidence-based assessment table”

- If evidence shows the presence or absence of an ecological impact caused by aquaculture operations, then effectiveness of management is irrelevant for a Seafood Watch assessment. The data used in taking the Evidence-Based Assessment approach is often incorporated into monitoring reports, which in turn are based on management requirements, so it is inherently accounted for.

40. “Develop the Management Effectiveness Database by country”

- We appreciate this suggestion and agree that it would be highly useful; we are currently considering how this could be achieved.

41. “Account for plastic pollution”

- We have addressed plastics in the revised Effluent Criterion.

42. “Combine Factors 2.2a+b and 3.2a+b into one Criterion and reduce the number of Criteria in each to focus on key environmental issues.”

- While we have not combined these two factors, we have changed their structure to better reflect the effectiveness of a variety of management systems to regulate aquaculture operations.

43. “Clarify the distinction between the Effluent (seems to address impact of solid and soluble effluents) and Habitat Criteria (seems to be addressing physical site impacts). Qualifying both based on an AZE is vague.”

- Explicit guidance has been added in the revised Criteria to denote the differentiations between these two criteria.

44. “The No Concern score of 10 states: “Data show all wastes are treated on site, or collected and disposed of appropriately.” The Criteria should recognize that there are many types of “treatment” of wastes, of varying degrees. It should be necessary for production systems that release treated waste to show data that these wastes are not having local or regional impacts”

- We understand the suggestion, and there is always the ability to make subjective judgments in the report. This flexibility allows us to recognize differences when sufficient information is available to demonstrate this.

- 45. “0-discharge score should only be given when effluent wastes are treated to the quality of influent water supply. Treated water does not equal to 0 discharge.”**
- This is already an explicit requirement.
- 46. “In risk-based assessment (Factor 2.1b – Production system discharge - Raceways or tanks), clarify ‘minimal’ or just replace with ‘20%.’”**
- The scoring table for Factor 2.1b has been revised, including the removal of ‘minimal’ when describing water exchange rates.
- 47. “Lack of governmental regulation should not automatically penalize producers who may in fact follow good practices”**
- We agree, as long as data demonstrates effective BMPs or performance on the key environmental parameters. Industry-developed Codes of Good Practices are also recognized, as are other similar management systems.
- 48. “Given that enforcement is generally lacking and industry representatives are biased sources of data, analysts must become very familiar with the particular industry and practices, in addition to conducting interviews with agencies and conservation organizations familiar with the specific industry.”**
- We recognize that enforcement is not always effective, and this is captured in Factor 2.2b, “Enforcement of effluent regulations and management measures.” The incorporation of experts from academia, government, conservation, and industry in the peer review process facilitates a complete understanding of the industry and its practices.
- 49. “Factor 2.1a does not account for pond biota (benthos, biofloc or probiotic use) assimilation of nutrients N or P. Factor 2.1.b may also be oversimplified.”**
- Factor 2.1a assesses the waste production on a per-ton of fish basis, not how that waste is incorporated into the receiving waterbody. The Criteria are developed to cover all scales, species, and production systems in all geographic locations globally, and therefore cannot provide effluent limits for specific waterbodies. If there is sufficient evidence to demonstrate assimilation (or lack thereof) of nitrogenous waste into a specific waterbody where production is being assessed, the Criterion would likely qualify for assessment via the Evidence-Based approach, and the assimilative capacity of the waterbody will be accounted for. The scoring table for Factor 2.1b works as a Risk-Based approach, where it must capture all scales, species, and locations, even though specific data for that system is lacking. However, the table has been revised to include more specific options for selecting the system that best fits the one being assessed.
- 50. “It should be necessary for production systems that release *treated* waste to show data that these wastes are not having local or regional impacts”**
- We have addressed this in the Evidence-Based scoring option for the Effluent Criterion.

51. “Some criteria recognize discharges from closed systems while others do not.”

- **Effluent Criterion: Zero discharge ponds have effluent discharge (it is 0.24).**
- **Effluent Criterion: Raceway tanks under total recirculation system and sludge removal also discharge waste (it is 0.2)**

VS

- **“Closed/biosecure” systems in Chemical and Disease criteria score high (No Concern - 10)**
 - Ponds and tanks that operate as zero-discharge systems have methods of collecting wastes, which could be subsequently disposed of inappropriately. In the scoring table, adjustments are available to use when data show that these collected wastes *are* disposed of appropriately, effectively reducing the discharge score to reflect No Concern. This adjustment renders the scoring similar to that for closed, biosecure systems that do not release active chemicals or pathogens/parasites.

Illegal sludge dumping

52. “Should we penalize illegal activity (even if sustainable)? “Buy” recommendations for producers operating illegally creates questions around the legitimacy of SFW recommendations.”

- In the revised Criteria, we have included illegal activity as a High cause for concern (i.e. score of 0 out of 10), and a Critical concern when there are demonstrable ecological impacts.

Improving Risk-Based Assessment table

53. “Need to address efficiency improvements in aquaculture industry and have scores reflect tech advancements”

- The Risk-Based scoring table acknowledges technological advancements in two places. Improvements to the efficiency of “inputs” (e.g. less wasted feed and better-engineered diet composition leading to lower FCRs) can be captured in Factor 2.1a, while advancements in waste treatment technology (i.e. filtration) can be captured by adjustments to the basic score of the system in Factor 2.1b.

54. “A fixed factor of 0.51 for ponds with a daily exchange seems unreasonable; 80% daily water exchange management should not be factored the same as 5% daily water exchange.”

- We have acknowledged this, and are in the process of making specific revisions to better capture the degree of water exchange in different pond systems.

55. “At least one recent reference should be given for the Effluent F2.1 final score table.”

- Scoring range is defined as 10 of 10 being an extractive (non-fed) species and 0 of 10 being a realistic, worst-case, highly polluting species (i.e. high protein content of feed and a high FCR in an open system).

Improving how the Risk-Based Criteria can assess the potential cumulative impacts (currently through management section only)

56. **“Good management should include acceptable limits to industry growth.”**

- We have revised the scoring table for Factor 2.2a to better address the management of potential cumulative impacts resulting from industry expansion.

57. **“Lack of governmental regulation should not automatically penalize producers who may in fact have good practices.”**

- We place priority on data-driven (i.e. Evidence-Based) assessment. In the absence of robust data, we must use the presence of a regulatory system (in conjunction with system design characteristics) to assess the risk of impact. In addition, we have revised Factor 2.2 to recognize all types of management systems, not just government-imposed regulation (i.e. industry is not inherently penalized if Codes of Good Practice are robust and in effect).

Habitat Criterion

58. **“Do not penalize current operators for short term impacts years ago (F3.1, Ramsar)”**

- This criterion is based on assessing ecosystem functionality, and reversible, short-term impacts score higher than those which result in longer-term losses to functionality. We recognize that in some cases, this conversion occurred prior the siting of current operations, and this is reflected in our definition of ‘historical’ impacts (i.e. 15 years ago/Ramsar). However, we believe that operations sited in historically-converted areas are still less valuable for the provision of ecosystems services than areas in their virgin state, and are thus penalized appropriately.

59. **“Vague definition of maintaining ‘ecosystem services’ leads to subjective interpretation of which ecosystem services are critical (1. Those that society values, undergoing rapid change, or have no substitutes).”**

- Because the Criteria assess all production systems in various habitats in all locations around the world, a single, specific definition of “critical” ecosystem services may not be universally applicable. The three principles that are outlined are intended to guide analysts in evaluating which ecosystem services in the area of the assessment are critical. For clarity, examples have been suggested in the Appendix, but these are by no means an exhaustive or universal list.

60. **“Many mangrove areas have in fact been restored by industry and that fact should be recognized and possible rewarded in the scoring.”**

- We have included an option in the Habitat Criterion to recognize successful, effective restoration efforts.

Regulatory effectiveness

- 61. “Greater weighting could be placed on the habitat management factor (F3.2). Explicit requirement for zonal management should be the high-bar that we are striving for with this criterion.”**
- While we have not changed the weighting of Factor 3.2, we have changed the format of Factor 3.2a so that the highest possible score requires that an area-based management system is in place.
 - We have also added a category into Criterion 1 – Data that assesses the availability and quality of data describing management systems in place.
- 62. “The “permit process” does not adequately address impacts, whether they are individual or cumulative. Environmental assessments are typically weak and mitigation does not adequately compensate for impacts. Such shortfalls should be identified and evaluated accordingly. Others recommend that baseline-assessment or ongoing-monitoring-and-assessment become a criterion, or a key element (factor) for your habitat evaluations”**
- The format and wording of the two management tables in Factor 3.2 have been revised to better reflect the ability of management systems to adequately address cumulative impacts.
- 63. “In F3.2a question #3, we suggest including “...limited to an appropriate *locations by zonal management plans*, and thereby... this will encourage this type of assessment.”**
- We have revised the structure and questions in Factor 3.2 to reflect that area-based management is considered the best option for management of impacts from aquaculture operations.
- 64. “Classification of “High” for “freshwater lakes” is an oversimplification of varying turnover rates.”**
- Each habitat type – freshwater lake, included – listed in the table has variation within it, and if enough data exists to justify its movement to another value category for a specific assessment, that will be implemented.
- 65. “Suggestion to include ‘or expansion of existing sites’ to Q1 in F3.2a”**
- We have revised the structure and questions in Factor 3.2a to give the highest reward to industries that are managed in an area-based management system, which would include the expansion of existing sites. Lower scores are awarded to management systems of decreasing quality (e.g. those that may not effectively manage expansion of an industry in an ecologically sustainable way).
- 66. “Q2 and Q3 in F3.2b are more relevant to management effectiveness – suggestion to wrap these two questions into one and move it to section F3.2a”**
- We agree, and have restructured Factors 3.2a and 3.2b to reflect this change.

67. “Habitat impact analysis should be scored ecologically where major drivers in the system (physical, chemical and biological), habitat and species associations, stressors (both natural and anthropogenic), resiliency, responsiveness, and other factors are used to properly evaluate impacts”

- If any of these drivers of the ecological system has been “stressed” sufficiently such that functionality of “Critical ecosystem services” are disrupted, it will be reflected in the scoring of the Habitat Criterion. Many of the drivers listed in the comment above are listed as indicators of ecosystem health in the Appendices.

Addressing cumulative impacts

68. “Greater weighting for cumulative impacts?”

- In the revised Criteria, we have restructured the management sections of both the Effluent and the Habitat criteria to give the highest scores to assessments using area-based management to address cumulative impacts.

69. “Critical habitat impacts needs stronger weighting.”

- The ongoing loss of a “high-value habitat” scores a 0 of 10 in Factor 3.1 of the Habitat Criterion. If there is ongoing loss of functionality of critical habitat (i.e. F3.1 score 0 of 10), the Habitat Criterion automatically scores Red (despite the score of Factor 3.2).
- We have also added an option for an automatic score of 0 of 5 for Habitat Factor 3.2b if illegal activity (e.g. siting of farms) is taking place. This will not necessarily result in an automatic Red score for the Habitat Criterion; however, it is generally assumed that siting of farms in high-value habitats is commonly illegal and will result in a low score for both Factors 3.1 and 3.2 and a Red overall Habitat Criterion score.

Chemical Criterion

70. “Different approach to Chemical Criterion: Scoring should take into account the “Main principles of responsible and prudent use of antibiotics in food animals (e.g. OIE Guidelines)”- where producers will receive high scores based on how well they meet the Criteria and volume of antibiotic used. Scoring based on the application of the Principles allows for objectivity and transparency.”

- The guidelines referenced in the comment are aimed at ensuring animal and human health, while the Seafood Watch program is aimed at ecological sustainability. While the importance of animal and human health is understood, deferment of Seafood Watch to these OIE guidelines would not be consistent with the mission of the program.
- We have added an option for an increased score in the Chemical Use Criterion if evidence demonstrates that there is a downward trend in overall chemical use over a time period of 5 or more years.

71. “Include a regulatory management section, where we reward efforts to reduce risk and minimize disease transfer (i.e. veterinary oversight), or penalize for lack of regulatory limits on overall chemical use”

- We have proposed a scoring option for “Regulations or management measures are in place that limit the frequency of use and/or total use of chemicals.” This option scores as a “moderate” risk because while it may put a cap on total chemical use or frequency of use, it cannot be assumed that this cap is based on ecological factors. Similarly, veterinary oversight does not necessarily limit the total use or frequency of use of chemicals.
- Seafood Watch will not defer to regulations or other management measures as a proxy for chemical use unless they include robust limits on total use, or the permitted use of those chemicals has been justified by applicable environmental monitoring or assessments (includes veterinary oversight). We are most interested in data on performance, and rely on regulation to assess risk when data is unavailable.

72. “Antibiotics should not be used to promote growth, and should not be used to counter overcrowding or poor husbandry.”

- The focus of this criterion is the ecological impact of chemical use. We are concerned with the impact that chemicals have beyond the farm (i.e. on non-target species), as opposed to their use in farm practices.

73. “There is no accounting for antibiotic residues in harvested tissue (risk to human health). There remains a high risk of build-up of resistance in harvested product residue levels.”

- This is a food safety issue and outside the scope of a Seafood Watch assessment. Scoring options exist in the Chemical Criterion table for evidence of developed clinical resistance to chemicals that are highly important or critically important to human health (as defined by the World Health Organisation) and are used as a proxy for ecological impact due to a general lack of available data on ecological impacts of antibiotic use.

74. “Addressing use-frequency and quantity: 1 large dose or 2 small doses, which is worse?”

- Our assessments are based on impact to the environment (i.e. non-target species), so it would depend on the impact of both scenarios. Both (or neither) could have an ecological impact.

75. “SFW should score based on current use and historical trends.”

- A trend adjustment has been implemented in the revised criterion: if data shows a decline in chemical use over time, sufficient in volume and rate, to give confidence that improving management practices are leading to clear reductions in use and the risk of impacts, a positive adjustment is available.

76. “Recommend incorporating the WHO Principles to increase the credibility and transparency of the chemical criterion”

- The WHO principles have been valuable as a resource to help inform the development of the Chemical Criterion (i.e. chemicals highly and critically important for human health are used as a proxy for ecological impact), but adopting them in their entirety is outside the scope of our Criteria.

77. “What does “significant quantities” mean in Moderate-high & High score?”

- A definition for *significant* specific to its use here has been added: “The average frequency of use of the farms being assessed is more than once per production cycle, or if data on the total volume of antibiotic use (if this is the only data available) implies the same (estimated)”.

78. “No mention of animal welfare”

- Animal welfare is beyond Seafood Watch’s scope, and as such, is not a part of our assessments.

79. “Chemicals should not target native species that play important roles in marine ecosystems”

- The Chemical Use Criterion assesses impacts to all non-target animals (i.e. native and non-native species in the environment). If a species is being farmed and chemicals used in that system are discharged and have an impact on wild native populations it will be recognized in the criterion and scored accordingly.

80. “Chemical use needs stronger weighting”

- We weight all of the “non-exceptional” Criteria the same in the final scoring of assessments.

81. “Link chemical use to disease in an industry.”

- While these two criteria are closely connected, the ecological impacts of chemicals in the environment are notably different from the ecological impacts of disease in the environment; therefore, we assess them separately.

Illegal chemical use

82. “We suggest moving “Banned or illegal chemicals” from High to Critical”

- We have left “Illegal chemicals (as defined by the country of production) have been used” as a High concern (score 0 of 10), however we have added a Critical scoring option for “Illegal activities with demonstrable negative environmental impacts.”

Feed Criterion

83. “Remove references to feed-specific data, and Factor 5.3.”

- Resource use to produce feed for aquaculture is a major limiting factor in the sustainability of the industry. We encourage companies to be as transparent as possible with feed ingredient information, as it makes the assessment more accurate. Furthermore, greater transparency (i.e. more data) in Factor.5.2 Net

protein gain or loss is rewarded if feed ingredients can be identified. Factor 5.3 acknowledges and assesses the overall impact of aquaculture feed production on land and in marine environments; looking at aquaculture feed production holistically.

84. “With the basic consideration that any FM or FO inclusion is bad and then reliance on a variation of a fish in –fish out model, the industry needs to see some type of reward or recognition for progress in producing greater quantities of fish with the same or less FM and FO.”

- The Criteria is designed to reward producers who lower their Economic FCR and/or use feeds made from fisheries byproducts (as opposed to whole fish from reduction fisheries); these efforts increase scores in both Factors 5.1 Whole fish use and 5.2 Net protein gain or loss.

85. “Reduce complexity to focus on key environmental issues (e.g., total use of marine ingredients, FCRs)”

- The suggested parameters (total marine ingredient use, FCR) are the base of our Feed Criterion assessment, but there are several other important aspects of feed formulation and use that should be considered. However, in the absence of additional data, the parameters listed in the above comment, along with the protein content of feed, can relatively simply form the Criterion 5 – Feed score. Additional information offers potential increases in scoring and more accurate representation of the industry under assessment.
- We are currently revising the structure of the Criterion to be more intuitive.

86. “The FIFO should also be applied to the amount of fish consumed by wild fish to give context. Similar comment in Disease Criterion: Infection rates should be compared to wild seed”

- The amount of fish consumed by wild fish and farmed fish are not viewed as comparable by Seafood Watch, as it is our assumption that food webs in the wild are natural systems, while aquaculture feed production using wild caught fish is not.
- In the Disease Criterion, if data on background levels of disease in the wild is available, it is accounted for in the assessment of the degree of impact on wild stocks from farms (i.e. if disease or parasite levels rise above background level due to aquaculture these impacts are taken into account in the scoring).

87. “This factor does not account for the primary production capacity (phytoplankton/zooplankton) in the vicinity of shellfish farms, and the potential for competitive food web interactions (competition for phyto/zoo-plankton).”

- Species under assessment that do not require external feed are given a score of 10 of 10 in criterion 5 - Feed. However, if there are impacts to phytoplankton/zooplankton communities or competition with other species for

phytoplankton/zooplankton as feed resulting in population level impacts to wild native populations, these impacts will be accounted for in the Habitat Criterion as a loss of ecosystem services due to conversion of habitat for aquaculture.

88. “There is less “loss” of nutrients into the water with extruded feeds as compared to dry-compressed feeds. Perhaps SW should encourage use of extruded feeds and score a bonus point”

- We do not endorse any one feed type, but assess the efficiency and sustainability with which feed ingredients are converted into harvestable fish. If fish are given more feed because of a loss of nutrients from using dry-compressed feeds as opposed to extruded feeds, this will be reflected in the Economic Feed Conversion Ratio, which is part of the basic equation in Factor 5.1 to determine the Feed Fish Efficiency Ratio.

89. “What are the final scoring parameters based on? Arbitrarily? Need to justify or credibility should be questioned.”

- The final scoring of the Feed Criterion is based on the calculation $[(2 \times \text{Factor 5.1 score}) + \text{Factor 5.2 score} + \text{Factor 5.3 score}] / 4$. This calculation gives a double weighting to the Wild fish use factor (5.1).
- The scoring parameters and the rationale behind their implementation are articulated in the Criteria document; we believe our approach is adequately justified.

90. “In protein gain or loss, use Biological value (BV). It’s a measure of the proportion of absorbed protein from a food which becomes incorporated into the proteins of the organism’s body”

- For the sake of simplicity, it is assumed in the Feed Criterion that proteins from fish and terrestrial animal protein ingredients are of higher biological value for humans when compared to those from crop ingredients. These differences are accounted for when calculating the net loss or gain of protein associated with production of the species being assessed.

Changing FI: FO equation

91. “Use the method devised by Crampton, which uses two measures: Marine Oil Dependency Ratio and Marine Protein Dependency Ratio.”

- We have considered the equation devised by Crampton (i.e. the ‘industry’ equation), however, we have decided to maintain our use of the ‘academic’ equation. The combination of both fishmeal and fish oil in the same equation is based on the assumption that fish meal and oil can be obtained from the same fish. This equation results in lower values, particularly where there is a large difference between meal and oil inclusion rates. In contrast, the ‘academic equation’ gives higher FFER values because it ignores the production of both fish meal and oil from the same fish. The

high value of the 'academic' equation does not allow for this 'spare' fishmeal (or oil), yet gives a real-world and valid value for the amount of fish that would need to be caught to produce one unit of farmed fish.

92. “Not sure I understand why the 2.5 factor is multiplied by FI:FO before subtracting from a 10-score? (FIFO score = $10 - (2.5 \times \text{FI:FO})$)”

- This equation is the function used to translate the FI:FO value into a score on a scale of 0-10. Using 2.5 in this equation effectively sets the FI:FO value limit at 4:1, which we believe is a threshold for the highest concern (i.e. a FI:FO value of 4 or higher results in a score of 0 of 10).

Including fishery by-products in edible protein calculations

93. “Use of these resources serves as a “credit” or benefit scoring rather than having a negative influence on scores”

- Fishery byproducts are considered “non-edible” protein in the Factor 5.2 protein gain/loss calculations. The proportion of non-edible marine ingredients (along with non-edible land animal ingredients and non-edible crop ingredients) are subtracted from the total protein content of the feed to obtain the value for “Protein In” (i.e. essentially giving them a “free pass.”). Therefore, while they are not given a credit, their use is not penalized in the calculations.
- New guidance has been implemented in the revised Criteria: “Seafood Watch supports the use of by-product ingredients (e.g. fisheries or land-animal by-products) in aquaculture feeds, but also recognizes the ecological costs of their production and harvest, which are arguably the same as their counterpart co-products (e.g. fillets or edible meat). This criterion currently does not include fishery by-product fishery in the Wild Fish Use Factor, or land animal by-products in the Protein Retention Factor because this might disincentivize their use in favor of whole ingredients, but they are included in the Feed Footprint Factor.”

Including terrestrial by-products in edible protein calculations

94. “I would recommend that the use of these resources serves as a “credit” or benefit scoring rather than having a negative influence on scores.”

- Terrestrial animal byproducts are considered “non-edible” protein in the Factor 5.2 protein gain/loss calculations. The proportion non-edible animal ingredients (along with non-edible marine ingredients and non-edible crop ingredients) are subtracted from the total protein content of the feed to obtain the value for “Protein In” (i.e. essentially giving them a “free pass.”). Therefore, while they are not given a credit, their use is not penalized in the calculations.
- New guidance has been implemented in the revised Criteria: “Seafood Watch supports the use of by-product ingredients (e.g. fisheries or land-animal by-products) in aquaculture feeds, but also recognizes the ecological costs of their production and harvest, which are arguably the same as their counterpart co-products (e.g. fillets or edible meat). This criterion currently does not include fishery

by-product fishery in the Wild Fish Use Factor, or land animal by-products in the Protein Retention Factor because this might disincentivize their use in favor of whole ingredients, but they are included in the Feed Footprint Factor.”

Source fishery sustainability

95. “The Fishsource Criteria for -2 should read “Fishsource scores ≥ 6 , and the score for spawning stock biomass is ≥ 8 ””

- We have added this into the revised Criteria.

96. “Assumptions made by Tacon and Metian are corrected in Jackson (2009). Scoring should recognize that leftover meal/oil from feed production is not waste.”

- The ‘academic’ equation used does not account for the use of this ‘spare’ fishmeal or fish oil. However, it gives the more valid and precautionary figure of the amount of fish that would need to be caught to produce one unit of farmed fish. There is no way to know that all leftover meal/oil from feed production is not waste with any certainty and we must default to a precautionary approach.

Feed footprint

97. “Why would SW score a 10 for no terrestrial agricultural area and tonnage? Do not agree with the 5.3 scale. If you want a low FIFO ratio you require a high row crop grain input. If the priority is to reduce dependency on constrained marine protein; it must be replaced so responsible agriculture.”

- The scoring scale for Factor 5.3 applies to area used to produce all ingredients included in aquaculture feeds, not only crop and terrestrial ingredients. It is the intention of the Feed Footprint Factor to assess the efficiency of all types of ingredients in aquaculture feeds (marine, terrestrial animal, crop). While it is considered more efficient to use crop ingredients than marine, there is still an ecological cost associated with production of crop ingredients, which is recognized in Factor 5.3.
- The overarching priority is given to maximizing the efficiency of products going in. The Feed Criterion addresses the efficiency of all ingredients going into operations (marine, terrestrial animal and crop); crop ingredients also have an ecological impacts and are already considered most efficient in the Criteria.

98. “Drop this factor - The only meaningful comparison is between different trophic level feeding”

- We believe that measuring the ecological cost of production of land and ocean ingredients is important to consider in our assessments.

99. “2.64 tons per hectare crop yields is low. Major, best in class, soy producers (USA & Brazil) are close to or exceed 4 tons per hectare yields (see in F5.3b (E)). Other comments suggest lowering the average crop yield: Average yield of major feed ingredient crops should be

reduced to address the fact that the whole-crop is never used in feeds, but rather a processed fraction of it”

- The crop yield value of 2.64 tons of crops per hectare is based on FAO’s crop statistic database.
- Given the balance of comments suggesting higher and lower values for this yield value, we will continue to use 2.64 tons as the average crop yield per hectare value.

Escapes Criterion

100. “What is the concern level for open net pens WITH “effective Best Management Practices?”

- Open net pens are inherently more prone to escapes than closed, land-based systems, even with the implementation of Best Management Practices. We appreciate that net pen design and management is improving, but we must maintain a precautionary approach. The revised Criteria does incorporate the possibility for open systems to be of Moderate concern, based on their degree of biosecurity implementation beyond BMPs or a demonstrable track record of low escapes.

101. “Include a regulatory management section to reward industries that have regulations in place that require plans for escapes.”

- The existence of regulations does not always mean that they are enforced properly or are effective at reducing the risk of escape. Additional BMP and biosecurity components have been integrated into the Escape Risk table, but the use of data is a more robust approach than the existence of regulations for measuring impact.

102. “Create a baseline response for Part C based on the life history traits of a given species (i.e. you would expect the responses to these five questions to be the same for tilapia cultured in ponds in Ecuador and Taiwan)”

- Part C of the Invasiveness Factor can vary based on geographic location (i.e. the biological impacts of escaped tilapia in Ecuador may not be the same as those in Taiwan if the environment in which farming is occurring is sufficiently different).
- The revised Criteria has combined the three tables in the Invasiveness Factor into one addressing potential invasiveness impacts from native and non-native species along with life history traits of the assessed species.

103. “SFV should consider genetic modification of species farmed”

- The Criterion assesses the potential for genetic impacts to wild populations based on the number of generations hatchery-raised the grow-out stock are (i.e. four generations hatchery-raised and selected broodstock will have genetic differences from wild populations that may not be favorable for wild populations if escapes interbreed).
- We do not consider the impacts of Genetically Modified Organisms (GMO).

Recapture & Mortality Score

104. “RMS appears to be very subjective”

- The RMS scoring tool has been deleted in the revised Criteria. In its place, we have created the allowance for scoring adjustments in Factor 6.1 – Risk of escape (recaptures) and in Factor 6.2 – Invasiveness (mortalities). Adjustments can be made where it can be demonstrated that the number and timeframe of escapees that are recaptured or do not survive is such that they will not have impacts to the ecology of the receiving waterbody.

105. “RMS: operators shouldn’t be dinged for absence of recapture if it’s prohibited by regulations”

- This is not an area for penalization, it is used as recognition of effective recapture methods or evidence of mortality. There are no points taken away for no recapture or mortality, only points given for evidence of such.

Invasiveness

106. “Table A (high score for native stocks) is contradictory with Criterion 8 (low score for native stocks)”

- We understand this challenge, however, addressing one issue can create another issue and we aim to capture both (e.g. in order to avoid depleting wild stocks of salmon, grow-out stocks are used that can diminish the genetic fitness of wild populations if they escape and interbreed OR, in order to avoid interbreeding of farmed and wild populations production relies on wild caught broodstock).
- It IS possible to score highly in both C6 and C8. If the genetic differentiation between hatchery-raised stock and its wild conspecific population is such that the two cannot interbreed, then there is a reduced risk of impacts to the fitness of wild populations. Conversely, if wild broodstock are sourced from a demonstrably sustainable fishery and are not contributing to a population-level impact on that stock their use is not penalized in Criterion 8. However, reports often fall in the grey area in between these scenarios. That is a reflection of the complexities of production of farmed species. These two issues are intertwined, and Seafood Watch has determined that both issues are important to include in an assessment despite the fact that, at times, they may seem contradictory.

107. “Linear increase in environmental concern with increasing generations of domestication should rather instead be based on evidence of impact than arbitrary scoring”

- The linear increase in concern with increasing generations of domestication is a proxy for risk, as there is often no data available to describe the actual impact. Ideally, this information would be available for use in assessments, and if it does exist and contradicts the information in the linear scoring, the data will be deferred to. However, it is very rarely the case that evidence of impact or lack of impact exists.

- The revised Criteria has integrated the three tables (Parts A, B, and C) into one that considers the impact of escaped native and non-native (including the degree to which non-native species are ecologically established) fish. However, the linear increase in concern is still directly correlated with the increase in domestication.
- 108. “Did the species become established as a result of aquaculture escapements or was the species introduced prior to aquaculture for other reasons (such as fishing); the former instance would result in a lower score than the latter. Also, perhaps a scoring grid would be appropriate as it would add the dimension of time since establishment to the assessment?”**
- The revised Escape Invasiveness table integrates these potential scenarios:
 - “Non-native – became fully ecologically established in the production region as a result of aquaculture > 10 years ago” Score 6 of 10
 - Non-native - fully ecologically established in the production region prior to aquaculture Score 8 of 10
- 109. “How is invasiveness scored for native farmed species?”**
- Typically, the most “invasive” impact of native escapes on their wild conspecifics is genetic introgression, and while this is considered heavily in the scoring table, so is the potential for added competition for food, habitat, or other ecological necessities.
- 110. “Genetic impacts from *non-native* species needs stronger weighting”**
- It is not generally believed that escaped non-native species will interbreed with wild native species, and therefore not assessed in the Criteria. If sufficient evidence exists that this is occurring, it will be scored accordingly in the Invasiveness Factor.
- 111. “Part B – Non-native species max score of 2.5 doesn’t reflect potential lack of impact”**
- Scores for native and non-native species have been integrated into the same table and both now have the same scoring range.
- 112. “Invasiveness: Species that are hatchery raised for >4 generations and specific pathogen free thus resulting in minimal disease transfer and wild-stock depletion risk are inherently scored low in this table A.”**
- These are two different impact categories: impacts from genetic differentiation are scored in the Invasiveness Factor of the Escapes criterion, while impacts resulting from disease transmission (or lower risk of disease transfer due to SPF or SPR juveniles) are scored in Disease Criterion.
 - Species that are native and are >4 generations hatchery raised are considered likely to have genetic differences from the wild, native populations, and are therefore viewed as a high risk and scored low.
- 113. “Invasiveness: Allowing a significant number of escapes goes against best practices and should never be rewarded by high scores. I realize that component is captured in 6.1.a but...”**

- We do not assess effectiveness of production practices or best practices; rather, we assess ecological impact resulting from production. If a large-scale escape event were to occur, and evidence showed that there were no impacts to wild, native populations, the score would be high.

114. “I have concerns that an independent certification system that does not allow more than 300 animals escaping over a 2.5 year cycle and using open net pens WITH best practice to reduce escapes would score low in this criterion. Clearly the environmental impact of <300 animals escaping must be very limited and setting an ambitious metric on this criterion”

- This Criterion is applicable to all species. As such, setting a limit for an acceptable number of escaped species is impractical because different species have differing invasiveness characteristics. The escape of 300 animals over 2.5 years could have a significant impact depending on their potential for ecological establishment, competition for food and habitat, predation, and/or disturbance to wild populations. Because of this, the scoring of the Invasiveness factor 6.2 is based on the characteristics of the species under assessment in the specific geographic location of assessment.

Disease Criterion

115. “Given the lack of data, include “impacts on wild species” as an extraordinary score reduction factor. *Also in the same vein:* This criterion does seem to be overly harsh considering the very limited scientific evidence that diseases on farms has any significant impact on wild stocks”

- The revised Disease Criterion has more adequately addressed the difficulty in obtaining robust data on disease transmission from farm to wild fish by creating both Evidence-Based and Risk-Based scoring options. While data-driven scoring will speak for itself, we believe sufficient evidence of disease transmission exists to justify the precautionary approach we have taken in the Risk-Based Assessment (i.e. scoring based on presence of disease on the farm and the openness of the production system to natural waterbodies).

116. “Needs to consider level of risk, not just if an outbreak has occurred”

- We agree, and the revised Disease Criterion now has Risk-Based and Evidence-Based Assessment options. We only score based on the level of risk if robust data on the impacts of disease transmission to wild species is absent. We have used presence of disease on the farm and openness of the production system as proxies for risk. While we understand that there are other factors determining risk (e.g. virulence of the pathogen, susceptibility of wild populations etc.), there is often very little information on these topics, and they have therefore been mostly left out of the

Risk-Based Assessment. However, if this information is available, it can inform the scores in this Criterion.

- 117. “Include regulatory management section in Disease Criteria (or at least bonus points for established protocols managing disease impacts)”**
- Regulatory management has been integrated into the Risk-Based Assessment scoring table.
- 118. “Consider simplified scoring model: 4 or less for demonstrated negative impacts, 4 to 7 for clear potential and above 7 for little if any potential would make more sense”**
- We have significantly revised the disease section and welcome further comments on it
- 119. “Reduce complexity to focus on industry level disease outbreaks.”**
- This Criterion does not assess effectiveness of industry management of disease, however, it does look at industry and “typical” farm-level disease outbreaks as a proxy for ecological impact within the Risk-Based Assessment implemented in the revised Criteria. This Risk-Based Assessment is used if data specific to ecological impacts of disease from aquaculture is lacking.
- 120. “Concerned that no risk is attributed to other disease vectors such as zooplankton, crabs and birds (There is a level of risk even for land-locked farms [10/10 in Criteria])”**
- Language has been added to the Risk-Based Assessment table clarifying that biosecurity protocols should include management of disease transfer via effluent AND other vectors. If disease transmission from these potential disease vectors has been documented, it will be included in Seafood Watch assessments, but only from the perspective of its impact to the environment and not from its impact to the standing (i.e. farm) stock.
- 121. “Not all hatchery products are considered equal (broodstock). SPF or SPR should also be considered. Antibiotic free hatchery production should also be considered”**
- While SPF and SPR certifications and antibiotic-free hatchery production are evidence for a lowered risk of impact at certain stages of aquaculture production from specific pathogens, they are not all-inclusive of the production process or of several of the complex realities of that production. For instance, SPF-certified juvenile finfish could be stocked in a net pen where they are subsequently at risk for contracting, amplifying, and retransmitting pathogens to wild populations. If sufficient evidence that the implementation of biosecurity measures, such as those suggested, has reduced the risk of impact of disease transmission, we will score accordingly. Additionally, we have determined that the most impactful aspects of aquaculture production typically occur during the grow-out process, and our

assessments reflect that; we do, however, consider the entirety of the production process before finalizing the scope of any assessment.

122. “Lack of data should be scored with precaution. Producers providing robust data should not be penalized (more data can possibly lead to worse penalties than an assessment with no data...)”

- We have revised the Criterion to have Evidence-Based scoring where robust data allow for it, and Risk-Based scoring where robust data is lacking. We have structured the Evidence-Based scoring table to allow for high scoring when it can be demonstrated that no disease transmission impacts are occurring.
- The potential for lower scoring with increased data is an unfortunate reality of the assessment process. We recognize that in some cases it creates a disincentive for producers to provide the necessary data, either rendering this information inaccessible or forcing the analyst to look elsewhere for information. We have accounted for this by including “unknown” scoring options in each criterion that score low.

123. Does ‘fully biosecure’ mean influent is also treated?

- Yes (among other things).

Source of Stock Criterion

124. “Make an exceptional criterion, but could control final overall ranking if Red or Critical”

- The Source of Stock Criterion has been changed to an Exceptional Criterion that can be Red or Critical.

125. “Include stock health; recommend that SFW recognize the value of wild-stock sourcing of seedstock if it is sustainably managed”

This is explicitly addressed in the criterion:

“Source of stock score = the percentage of production that originates from either:

1. wild caught juveniles or seed, unless they are from passive influx or natural settlement (e.g. shellfish)
2. wild-caught broodstock unless the number used and/or the sustainability of the source can be demonstrated to be of minimal concern”

Predator & Wildlife Interactions Criterion

126. “Little data is available, other than for “hotspot” species or industries, skews like-to-like comparisons between affected wildlife species”

- Assessment of this Criterion is often based on the IUCN list of Endangered and Threatened species and any similar applicable local or regional lists. If other data is available to assist in the assessment of other species, it will be taken into account in

the scoring of this Criterion. In many cases, however, the species that interact with aquaculture systems are “hotspot” species.

- Impacts to other species (e.g. intertidal invertebrates at geoduck farm sites disrupted by beach clearing) that impact functionality of ecosystem services will be assessed in the Habitat criterion.

127. “Include regulatory management effectiveness factor for the wildlife criterion”

- Assessment of this Criterion is often based on the IUCN list of Endangered and Threatened species and any similar applicable local or regional lists within the jurisdiction of a regulatory agency. If other data is available to assist in the assessment of other species it will be taken into account in the scoring of this Criterion.

128. “Lower scores should be applied where aquaculture practices are known to result in death or injury to native species, or (conversely) practices are changed to avoid such injury or mortality.”

- Applying score reductions is how the Criterion currently works. No positive adjustments are given to for improved practices, but lesser deductions can reflect successful efforts to reduce wildlife mortalities. It is assumed that wildlife species interacting with aquaculture operations are native species.

129. “Use this criterion as an extraordinary score reduction factor for industries where data on impacts are available.”

- This is how the Criterion is currently used.

130. “Concerned that transparency, accurate and mandated reporting and continuous improvement to reduce incidence frequency are all pointing to a low SW score on this criterion.”

- This is an inherent characteristic of this type of assessment. High quality data is rewarded in the Data Criterion; however, if it shows that there are negative ecological impacts occurring, it will be scored low in the Criterion it directly addresses. This can create a disincentive for producers to provide data if they believe it could lead to a lower score. In that scenario for the Predator & Wildlife Interactions Criterion, it is assessed using known impacts from similar production systems in similar geographic locations and any IUCN or equivalent local or regional listed species as a proxy for likely impact.

Unintentional Species Introductions Criterion

131. “This criterion should include the potential for increasing non-indigenous species.”

- This Criterion is currently based on the risk of introduction of non-target species using trans-waterbody or international movements of live animals and biosecurity protocols as proxies for this risk.