

Farmed Salmon Purchasing Policy Update -- April 2007

Goals and purposes

[Company] has established a purchasing policy for farmed salmon in order to provide environmentally-preferable products for our customers and to promote environmental progress in the salmon aquaculture industry. This policy requires suppliers to take important steps forward on key environmental issues, to set a specific timetable for implementing these changes, and to implement an auditing and reporting system to insure that real progress is made.

We share the goal of continued progress toward environmental sustainability in the salmon aquaculture industry, which would include elimination of key environmental impacts such as escapes of farmed fish, disease transfer from farmed to wild stocks, discharges of untreated wastes into the ocean, use of antibiotics and harmful chemicals, harming of wildlife and the dependence on wild fish stocks used to produce salmon feed. The purchasing standards below make important progress on these challenges within the context of current technological and cost constraints, but further progress is necessary. To promote continued progress in the farmed salmon marketplace, we have also established a purchasing preference for suppliers that adopt innovative production systems to further reduce or eliminate impacts on aquatic ecosystems while meeting our standards for quality, cost, and supply availability. One such production system may be closed containment, where closed tank systems help prevent the transmission of disease, parasites, waste and fish escapes from the farm to the marine environment. This technology is of particular interest in British Columbia and other regions where the impact on wild salmon of sea lice present on salmon farms is a significant concern.

The purchasing policy consists of three interconnected parts – a set of performance-based purchasing standards based on best available techniques and environmental outcomes, a purchasing preference for suppliers who go beyond those purchasing standards, and an implementation plan covering auditing, reporting and timeline for making operational changes. Under the implementation section, suppliers are required to provide an annual public report demonstrating their progress on the standards below, and guidance is provided on the specific information that should be included in that report. As new technological developments or research findings become available, we will modify the policy to continue to reflect the latest scientific information and to continue to push aggressively for environmental progress.

Purchasing standards

[Company] will only purchase farmed salmon that is high quality, healthful, and environmentally preferable, as demonstrated by the following purchasing standards. These standards apply to farming operations in North America producing salmon for [Company].

[Company]
Farmed Salmon Purchasing Policy
Update -- April 2007

1. Purchased salmon meets all U.S. and international health standards and advisories for regular consumption. To meet the most stringent health guidelines, concentrations of the following contaminants must be at or below the following levels:
 - Mercury - 0.22 ppm
 - PCBs - 0.011 ppm (11 ppb)
 - WHO-TEQs (dioxins, furans, and dioxin-like PCB's) - 0.50 ppt

2. In salmon production, the ratio of wild fish consumed to salmon produced is below one-and-one-half to one; fish meal and oil is preferentially sourced from byproducts of fish processing. Meal and oil is not sourced from overexploited fisheries.
 - a) The ratio of wild fish consumed for fish meal to salmon produced and the ratio of wild fish consumed for fish oil to salmon produced (the so-called “fish conversion efficiency” or “fish-in to fish-out” ratios) will each be equal to or less than 1.5:1; continuous reductions are demonstrated to further lower this ratio with a goal of achieving a 1:1 ratio within five years. Only wild fish captured for meal and oil production are included in calculating this ratio; fish meal and oil made from fish processing byproducts are not included in calculating wild fish inputs.
 - b) No matter the diet, eight ounces of salmon (227 g) will provide no less than 80% of the of the long-chain omega 3 fatty acids (EPA+DHA total) of salmon fed a conventional (100% fish oil) diet and at least 1820 mg of EPA+DHA (the National Academy of Science Institute of Medicine’s weekly recommendation).
 - c) Fishmeal or oil not made from byproducts will not be sourced from any reduction fishery classified by provincial, national or international fisheries authorities as follows: 'at risk of reduced reproductive capacity'; 'suffering reduced reproductive capacity'; 'harvested outside precautionary limits'; 'overexploited'; 'depleted'; 'overfished'; 'overfishing is occurring' (or any other comparable classification).
 - d) Fish-processing byproducts used in feed will be sourced from fisheries, other than salmon, certified by the Marine Stewardship Council, or from fisheries not listed in the “avoid” category of the seafood ranking programs of leading marine conservation organizations.

3. Escape prevention systems are designed and implemented to eliminate escapes, to document any exceptions, and to reduce the impacts on wild stocks of any escapes that do occur.

[Company]
Farmed Salmon Purchasing Policy
Update -- April 2007

- a) Production sites producing fish under these standards will have a record of no major escape incidents for at least the five preceding years.
- b) A marker system for identifying the producer of any escaped fish (for example through DNA signatures) will be investigated and implemented. Information about how to use the marker system to identify fish will be made publicly available.
- c) Any escape incident involving more than 100 fish will be reported within 12 hours to the responsible fishery authorities and to [Company]; comprehensive data on escapes will be included in the supplier annual report.
- d) Technology will be adopted to limit the reproductive potential of any escaped fish:
 - i. Chinook salmon produced in open net cages under these standards will be all-female. All-female Atlantic and coho salmon will be placed in commercial production within three years of the start of salmon sales under this policy; within five years, all Atlantic or coho salmon produced in open net cages under these standards will be all-female.
 - ii. suppliers are encouraged to develop the technology for reproductively sterile stocks. Suppliers that demonstrate that their stocks are sterile are not required to meet the above provisions concerning all-female stocks.
- e) Hatcheries and smolt production sites will have no potential for escapes.
- f) No genetically-engineered fish will be stocked.

4. Drug use is minimized or eliminated.

- a) No antibiotics are used in the production of Atlantic salmon. If Atlantic salmon require treatment with antibiotics for a diagnosed disease, the treated fish will not be sold as meeting these standards.
- b) In Chinook or coho salmon production, ongoing progress is demonstrated toward the goal of eliminating antibiotics use. If Chinook or coho salmon are diagnosed with a bacterial disease, antibiotics may be used only for the purpose of treating the disease. Antibiotics are not used for prophylaxis or other routine purposes.
- c) Parasiticides are only used to treat diagnosed conditions, and treatments with the least ecological impacts are selected.
- d) All drugs are used only under the supervision of a licensed veterinarian.
- e) No hormones are administered to fish intended for human consumption.

[Company]
Farmed Salmon Purchasing Policy
Update -- April 2007

5. Continuous reductions in the incidence of disease and parasites in farming operations is demonstrated and all feasible steps are taken to minimize the risk of disease transfer to wild stocks.
 - a) Suppliers will provide comprehensive reporting on disease and parasite incidence and control in the supplier annual report (see Appendix) and demonstrate continuous improvement.
 - b) In regions where pink and chum salmon are native, suppliers will take the following additional steps:
 - i. Adopt and revise on an ongoing basis management strategies (e.g. siting procedures, production cycle timing) with the goal of eliminating the exposure of susceptible wild salmonids to sea lice present on salmon farms.
 - ii. Not produce salmon in open net cages under this policy in areas where peer-reviewed science shows that sea lice present on salmon farms have an adverse impact on wild salmon populations.
 - iii. As new research findings emerge, additional or different measures to reduce sea lice impacts on wild salmon will be incorporated into these standards and adopted by suppliers consistent with the best available science.

6. Water pollution is significantly reduced.
 - a) Demonstration systems to collect or recycle a major portion of the waste discharges of salmon net pens, such as integrated aquaculture systems or closed containment systems, will be implemented. These systems will be implemented at one salmon production site within one year and at three sites within three years. Unless these systems are demonstrated to be technically or financially infeasible, they will be implemented at a majority of sites within five years. The systems will be designed to reduce the total nutrients and organic matter dispersed into coastal waters per pound of salmon produced by at least a third from current levels.
 - b) All discharges of metals or chemicals from production facilities will be eliminated (except for feed constituents), including the use of anti-foulants on salmon netpens that discharge metals or chemicals.
 - c) Hatcheries will not release untreated effluent into natural water bodies; hatcheries and smolt production sites will have no detectable impact on the quality of receiving waters.

7. Impacts on sea floor (benthic) habitat are monitored and reduced.
 - a) The benthic environment (biological and chemical) is not at any time altered outside the tenure or lease area.

[Company]
Farmed Salmon Purchasing Policy
Update -- April 2007

- b) On soft bottoms (mud/sand/shell), levels of free sulfides at 30 meters from the edge of fish cages must not exceed 1300 micromoles at the time fish are stocked and must not exceed 3000 micromoles at any time during fish production at the site.
 - c) On hard bottoms (where sediment samples cannot be taken), *Beggiatoa* mats will not exceed 25% coverage of the sea floor up to 30 meters from the edge of fish cages and will not be present more than 30 m from the edge of fish cages.
 - d) Ongoing reductions in benthic impacts are demonstrated, with significant reductions in the degree and extent of benthic impacts demonstrated over a five-year period.
8. No killing or routine harassment of wildlife occurs in salmon production except when required to euthanize an entangled or otherwise seriously injured animal, or when human safety is threatened (e.g. if a seal cannot be removed from a pen without significant risk to workers).
- a) Acoustic deterrent devices (ADDs) or other devices that regularly harass wildlife will not be used.
 - b) Land-based disposal of wastes from salmon farms (such as salmon morts) will be managed so as not to attract terrestrial predators.

Purchasing Preference

[Company] supports continuous innovation in the farmed salmon industry toward eliminating the impacts of production practices. In particular, we look forward to a day when key environmental impacts such as escapes of farmed fish, disease transfer from farmed to wild stocks, discharges of untreated wastes into the ocean, use of antibiotics and harmful chemicals, harm to wildlife, and depletion of wild fish stocks to produce salmon feed, are eliminated. We therefore encourage suppliers to test and adopt production systems that further reduce or eliminate impacts on aquatic ecosystems. We are establishing a purchasing preference for suppliers who adopt innovative production systems while still meeting our standards for quality, cost, and supply availability. One such production system may be “closed containment” tank systems, which help prevent the transmission of disease, parasites, waste and fish escapes from the farm to the marine environment

Implementation and Compliance

Suppliers will provide an annual report demonstrating compliance with this policy and make this report available for public review. An independent third party will also regularly audit and report on suppliers’ performance on these standards (see Appendix I). Given that many suppliers will need time to implement the changes needed to fully achieve all the performance standards, salmon will be considered to have been produced in compliance with this purchase policy provided that: (1) suppliers are presently meeting at least five of the standards, including the first standard on contaminants; (2) within one

[Company]
Farmed Salmon Purchasing Policy
Update -- April 2007

year of the start of salmon sales under this policy, suppliers implement operational changes necessary to achieve all the standards; and (3) within two years, suppliers demonstrate full compliance with standards, unless a longer period is specifically noted above. It is our intention that [Company]' purchasing policy not conflict with local government measures and that compliance is consistent with or more restrictive than local laws. This policy will be updated as needed and guided by new scientific knowledge.

**Farmed Salmon Purchasing Policy Appendix I:
Background Information, Technical Notes, Definitions and Reporting Guidance
Update--June 2007**

Standard 1

Background

This standard is intended to assure customers that farmed salmon produced under the purchasing policy is safe for regular consumption. Research indicates that while contaminant levels can vary by farming region, some supplies of farmed salmon contain relatively high levels of PCBs and other organochlorines compared with wild salmon.^{1,2,3,4,5} This standard sets maximum levels for mercury, PCBs, and dioxin-like compounds in farmed salmon based largely on guidelines developed by the U.S. EPA.⁶ The EPA guidelines, among the most stringent in the world, are substantially stricter than U.S. FDA legal limits on seafood contaminants*.

Technical notes

For the purposes of this policy, regular consumption is defined as eight ounces (227 g) of fish per week (the amount recommended by the U.S. federal Dietary Guidelines Advisory Committee to reduce the risk of heart disease⁷). If recent contaminants monitoring data for sites producing salmon under this policy show compliance with the standard below, one new composite sample will be tested every six months. If no such monitoring data exist, or the data do not clearly show compliance, three composite samples will be tested every six months for the first year, followed by one composite sample every six months in subsequent years. Each composite sample will include skin-on fillets from at least three fish, and will be taken within two months of slaughter. For salmon produced on a high fish oil 'finishing diet', composite samples will be taken from fish within one month of slaughter. All samples will be submitted to an independently-accredited lab, and the testing described here will be conducted for each group of fish receiving a different feed formulation (i.e. varying fishmeal/oil content). Each composite sample should be analyzed for the following:

- Total mercury – with a minimum detection limit of 0.1 parts per million (ppm).
- Total PCBs** – as the sum of all 209 congeners according to EPA Method 1668A.⁸
- WHO-TEQs** – as the sum of dioxin/furan congeners and the 12 dioxin-like (non-ortho) PCB congeners, according to EPA Method 1613⁹ (Revision B).

*EPA is reassessing its guidance concerning TEQs. In the interim, farmed salmon will have WHO-TEQs at or below the average levels found in wild Alaskan Chinook, sockeye, and coho salmon (currently 0.50 parts per trillion [ppt]).^{10,11}

**Non-detected PCB, dioxin, and furan congeners will be considered as one-half the detection limit for the purposes of PCB and TEQ totals.

Reporting guidance

- Using the methodology described above, demonstrate that contaminant levels in fish currently produced under this policy are at or below the target levels listed in Standard 1. Individual samples within 20% of the standard can be considered compliant, as this

approximates the average standard deviation of contaminant levels in different samples of farmed salmon taken from the same location.^{12,13,14,15,16}

- Suppliers not initially at or below the target contaminant levels should provide at least one year of monitoring data demonstrating consistent compliance.
- Provide any previous contaminants monitoring data, for up to three years, for sites producing salmon under this policy.

Standard 2

Background

Farmed salmon production uses wild-caught fish to produce the fish meal and fish oil that is used in salmon feed, adding to the pressures on wild fish stocks.^{17,18} This standard requires suppliers to be substantially more efficient than the global average^{19,20} in terms of the amount of wild fish they consume per pound of salmon produced, and requires that they demonstrate continuous progress toward the goal of a 1:1 ratio of wild fish consumed to farmed salmon produced. (It is important to understand that the FCR or feed conversion ratio is not the same as the FI:FO or wild fish in: farmed out ratio.) The standard also requires that the fish meal and oil used to make salmon feed not be sourced from fisheries that authorities classify as depleted or over-fished. Finally, the standard promotes the use of fish processing by-products in the production of salmon feed.

Technical notes

Section (a): To calculate the ratio of wild fish consumed to farm fish produced, or “fish in:fish out” (FI:FO):

- Information needed: percentage of feed that is fish meal; percentage of feed that is fish oil; eFCR*; percentage of fish meal that comes from reduction fisheries vs. seafood processing byproducts; percentage of fish oil that comes from reduction fisheries vs. seafood processing byproducts; the reduction fisheries from which fish meal and oil originate.
- FI:FO for fish meal = number of units of wild fish required to produce the fish meal for one unit of farmed fish. Calculate FI as $eFCR * (\text{percentage feed that is fish meal}/100) * (\text{percentage of fish meal from reduction fisheries}/100) * 4.8$ (4.8 can be used as a typical conversion rate of whole fish to fishmeal, meaning it takes 4.8 units of sardines, menhaden or the like to make a unit of fish meal; use a more exact number if available).

FI:FO for fish oil = number of units of wild fish required to produce the fish oil for one unit of farmed fish. Calculate FI as $eFCR * (\text{percentage feed that is fish oil}/100) * (\text{percentage of fish oil from reduction fisheries}/100) * 8.3$ (8.3 is the conversion rate of menhaden to fish oil, meaning it takes 8.3 units of menhaden to make a unit of fish oil; check conversion rates for other fish species, since conversion rates to fish oil vary considerably.)

- Example: if eFCR = 2.0, percent fishmeal in feed = 25, and percent of fish meal from reduction fisheries = 93.75, then FI:FO for fish meal = $2 * 25/100 * 4.8 * 93.75/100 = 2.25$

*Economic FCR, or eFCR, is the best approximation of feed input to whole fish output. This figure should include mortalities, as well as blood, guts, and gills of harvested fish.

Fish processing by-products are typically scraps that might otherwise be wasted from the processing of fish for human consumption. Fish process by-products does not include fisheries bycatch. Producers should give preference to “feed-grade” by-products, rather than by-products that could be used as human food.

Section (c): Models used by fisheries management agencies do not currently assess whether catch of one species has significant impacts on populations of other species, for example by depriving predatory fish and birds of their prey. As models assessing ecological impacts become available, this standard will be updated to give preference to reduction fisheries managed in a manner that reduces the fisheries’ ecological impacts.

Reporting guidance

- Calculate the FI:FO ratio for the previous production year using the formula provided in Appendix I. The calculation should clarify assumptions about the eFCR, the inclusion rate of fish meal and oil in feed, the percentage of fish meal and oil that is derived from fish processing byproducts, and the conversion rates of fish to meal and oil
- Provide monitoring data on average EPA+DHA levels in fish harvested. This should be reported as grams of EPA+DHA per 100 g of raw fish, or as a percent of total lipid content.
- Confirm that no reduction fishery used for feed has been classified by national or international fisheries authorities as depleted or in other categories listed in section (c).
- Indicate whether source fisheries for any fish processing byproducts are certified by the Marine Stewardship Council or listed in the “avoid” category of leading marine conservation organizations. Key ranking programs to consult are the Monterey Bay Aquarium’s Seafood Watch (USA, www.seafoodwatch.org), SeaChoice (Canada, <http://www.seachoice.org/>), and the Marine Conservation Society’s Good Fish Guide (UK, <http://www.fishonline.org/>).

Standard 3

Background

Salmon that escape from farms can threaten local wild salmon populations, either by interbreeding with native species (thereby making them less genetically adapted to survive in the wild), spreading diseases to wild fish, or competing with them for resources.^{21,22,23,24,25} Under this standard, production sites must not have had any major escapes for at least five years. In addition, the standard aims to hold suppliers accountable for any escapes that do occur by marking all fish stocked such that the producer of any escaped fish can be identified, and immediately reporting any escapes. Suppliers will also develop technology to limit the

reproductive potential of any escapes fish by using all-female or reproductively sterile stock. Finally, the standard prevents the farming of genetically-engineered (transgenic) salmon.

Technical notes

Section (a): A major escape incident is defined as involving more than 0.5% of stocked fish.

Reporting guidance

- Include the site-specific escapes record over the preceding five year period for production sites producing fish under this policy, and demonstrate that none of these sites have had escape incidents larger than 0.5% of stocked fish.
- Provide an accounting of fish stocked and fish harvested at each production site producing fish under this policy, with a goal of achieving a counting accuracy of +/- 1% or less. Describe the counting methods used, the current estimated accuracy of the counts, and the potential to improve that accuracy.
- Describe the marker system that is used, and provide information on how the system can be used to identify the producer of any escaped fish
- Indicate the percentage female of all fish stocked in net cages under this policy, and describe how the goal of all-female Atlantic salmon will be reached within five years
- Demonstrate that the containment systems used at hatcheries and smolt production sites have no or extremely remote risk of escapes
- Confirm that no genetically-engineered fish were stocked, including the offspring of genetically-engineered fish.

Standard 4

Background

A variety of chemicals and drugs are typically used in salmon farming.^{26,27} Some of these are administered in open water and can accumulate in marine life (farmed and wild alike).^{28,29,30} In addition, the regular use of antibiotics in salmon farming can contribute to the proliferation of resistant bacteria.^{31,32,33} Under the standards, use of antibiotics and other drugs is tightly controlled and must be regularly reported. No antibiotics are to be used in the production of Atlantic salmon under the standards. Since fewer vaccines are available for chinook and coho salmon, antibiotics are permitted only for the purpose of treating diagnosed diseases. Parasiticides must only be used to treat diagnosed conditions, and if alternative parasiticides are available, treatments with the least ecological impacts must be selected.

Technical notes

Section (c): Parasiticide treatment methods involving the release of parasiticides into open waters must not be used when lower-impact methods are available.

Section (e): This prohibition extends to genetically-engineered feed components (e.g. crops that express growth hormones).

Reporting guidance

- Provide information on drug use over the preceding year by production site and drug type, demonstrating that:
 - no antibiotics were used in the production of Atlantic salmon sold under these standards
 - any antibiotics used in Chinook and coho production were for the purpose of treating diagnosed diseases
 - any parasiticides used were for the purpose of treating diagnosed conditions
 - a licensed veterinarian supervised all drug use
- Explain why parasiticides used had the least ecological impacts of those available.
- Confirm that no hormones were administered to fish produced for human consumption under these standards.

Standard 5**Background**

Diseases and parasites on salmon farms represent an economic loss to the supplier as well as a risk to wild salmon stocks.^{34,35,36} Research in British Columbia and elsewhere suggests that parasitic invertebrates called sea lice can spread from farmed to wild fish and harm wild salmon populations.^{37,38,39} This standard requires suppliers to demonstrate continuous reductions in the incidence of disease and parasites. The standard also requires that suppliers regularly report comprehensive disease and parasite monitoring results and make the underlying data available to researchers, so that they can better understand the impacts of diseases and parasites and develop new measures to prevent or mitigate them. Additional steps are required in regions where pink and chum salmon are native, since these species are particularly vulnerable to sea lice.

Technical notes

In British Columbia, these standards and strategies to reduce the exposure of wild salmonids to sea lice present on salmon farms, in particular, will be updated to reflect research results from the Framework for Dialogue between the Coastal Alliance for Aquaculture Reform and Marine Harvest Canada.

Section (b) ii: Areas referred to in this section include, at a minimum, the geographic areas for which data was generated and analyzed in the referenced studies.

Reporting guidance

- Describe strategies employed to prevent or manage diseases and parasites. Explain any recent revisions to these strategies, including in British Columbia steps taken in response to the findings of the Framework for Dialogue between the Coastal Alliance for Aquaculture Reform and Marine Harvest Canada.
- Provide a summary of all diagnosed or suspected disease or parasite events involving more than five fish at a site.
- Upon request, provide researchers with raw data concerning diseases or parasites, including pen specific disease/parasite incidence, intensity (per fish), and infection range.

Also provide data on potentially relevant environmental factors (e.g. salinity, temperature, dissolved oxygen).

Standard 6

Background

Salmon farming in open net cages releases wastes into coastal waters, including fish wastes and uneaten feed.^{40,41} In some regions, these waste discharges can contribute to harmful algal blooms and other water quality problems.^{42,43,44} Net cages are often treated with chemicals that can leach into surrounding waters and harm marine life.⁴⁵

This standard requires that innovative systems be put into place to collect or recycle waste. One way to recycle waste is to integrate the farming of fish with filter-feeders or “nutrient-absorbers” such as mussels and seaweeds which naturally cleanse water. The standard requires suppliers to reduce the total amount of waste and nutrient pollution discharged per pound of salmon by a third from current levels through integrated aquaculture or similarly effective systems. Salmon producers should focus their nutrient reduction efforts on nitrogen, since it is the nutrient typically responsible for eutrophication of marine waters. In addition, new net technology and other equipment must be used that have zero discharges of metals and chemicals.

Technical notes

To estimate the amount of nitrogen (N) released per pound of salmon produced, obtain figures for total N per unit feed and total N in an average pound of whole salmon harvested. Based on an estimated 0.07 lb N in feed, an eFCR of 2 and 3.5% of body weight as N, 0.105 lb of N per pound of harvested salmon may be used as a typical figure⁴⁶. First calculate N outputs = (units of feed used) x (total N per unit feed) – (pounds of salmon harvested) x (total N per pound of salmon harvested). Then calculate total N recycled or reduced. If N is recycled via integrated aquaculture, obtain the total N in a unit of seaweed, mussels, or other organisms being grown, from samples submitted to an independently accredited lab. Then estimate the amount of N in harvested biomass of seaweed, mussels, or other organisms, by multiplying for each organism (total N per unit organism) x (harvested biomass of that organism). Sum across each organism grown. Subtract this total from total N outputs to obtain total N released. Divide by the number of pounds of harvested whole salmon to obtain the amount of N released per pound of salmon produced.

To estimate the reduction in organic matter dispersed per pound of salmon produced, first calculate output of total suspended solids (TSS) = (units of TSS released per unit of salmon produced) x (number of units of salmon produced). Each pound of food produces approximately 0.25 lb of TSS. (Assuming an eFCR of 2, for example, each pound of salmon produced generates 0.5 lb TSS⁴⁷). Then calculate the organic matter recycled or reduced. If organic matter is recycled via integrated aquaculture, estimate the total amount of organic matter removed from the water column by mollusks or other filter feeders being grown. Mussels filter between 1 and 65 mg of dry suspended solids per day, depending on their size, 14 mg/day is a good mid-point to use⁴⁸. Obtain the figure for the total amount of particulate matter filtered during the production period per unit production of the filter feeder being grown by multiplying

the daily filtration rate by the number of production days. Organic matter recycled can then be estimated as (total particulate matter filtered per unit production) x (total units of mollusk production) x (0.35). Thirty five percent is the amount of organic matter ingested by a mollusk which is typically used for growth and removed by harvest of the mollusk.⁴⁹ If available, a species-specific number may be used instead. If more than one type of filter feeder is grown, sum across each organism. Then (total organic matter released) = (total suspended solids outputs) – (total organic matter recycled). Divide total organism matter released by the number of pounds of harvested whole salmon to obtain the amount of organic matter released per pound of salmon produced. These calculations do not include nutrients added to the environment from unconsumed feed.

Models are currently being developed and tested to better estimate the nutrient loading benefits of integrated aquaculture; the technical guidance above will be updated as these models become available.

Reporting guidance

- Provide calculations of baseline waste discharges as well as reductions achieved through collection/recycling systems. Indicate the dates by which waste collection/recycled systems will be installed at one site, three sites, and a majority of sites.
- Confirm that production systems and equipment do not discharge metals or chemicals
- Confirm that hatcheries used to produce fish under this policy treat all effluent through mechanical filtration, settling ponds, or constructed wetlands. If other treatment methods are used, provide data demonstrating that they are similarly effective.
- Provide data demonstrating that hatcheries and smolt production sites will have no detectable impact on the quality of receiving waters.

Standard 7

Background

Fish and feed wastes accumulate beneath net pens and can significantly alter the marine ecosystem in those areas.^{50,51,52,53} Under these standards, salmon suppliers must meet specific criteria for reducing impacts on the sea floor, continuously reduce those impacts over time, and regularly report on seafloor habitat conditions beneath and around their facilities.

Reporting guidance

- Provide benthic monitoring data at 30 meters from the edge of fish cages demonstrating that levels of free sulfides and coverage of hard bottoms by *Beggiatoa* mats are in accordance with the standard.
- Provide data demonstrating that the benthic environment (biological and chemical) is not altered outside the tenure or lease area, including baseline benthic data from outside the tenure area.

Standard 8

Background

In some salmon farming operations, seals, sea lions, birds and other wildlife are harassed or killed to discourage them from feeding on farmed salmon. Concerns have been raised that acoustic deterrent devices (ADDs), which emit noises underwater designed to repel wildlife, can alter the migration routes and habitat use of marine mammals.^{54,55,56} Under this standard, wildlife cannot be killed or routinely harassed, such as with ADDs. Exceptions to this rule can be made only when it is absolutely necessary to disentangle or euthanize a seriously injured animal, or when human safety is involved, such as when a seal cannot be removed from a pen without endangering workers.

Reporting guidance

- Provide records of all predators killed by production site for all sites producing fish under this policy.
- Provide evidence demonstrating that any predator kills were for the purpose of euthanizing an entangled or otherwise seriously injured animal or because human safety was threatened.
- Confirm that no ADDs or other devices that regularly harass wildlife were used.

Implementation and Compliance

Technical notes

The annual supplier report will demonstrate performance on each purchasing standard and compliance with the purchasing policy, following the reporting guidance above. The supplier will provide the annual report to the purchaser(s) and make it publicly available by either posting the report on the web or by posting on the web information about how to receive a free copy of the report. An independent third party auditor will conduct an operational audit and verify that the supplier report accurately and completely reflects the supplier's performance on these purchasing standards. The auditor will be provided a copy of the supplier report prior to visiting a farm. Suppliers will cooperate fully with the auditor, provide full access to all operations and personnel, and make available all information requested by the auditor. The auditor will be approved by [purchaser] and have no financial relationships to the supplier through consulting or other arrangement.

The auditing and reporting requirements can alternatively be met through integration of these purchasing standards into an ISO 14001-based environmental management system (EMS), provided that approach produces an annual public report demonstrating compliance with these purchasing standards and meets the above requirements concerning selection of a third party auditor and soliciting community input.

Definitions

Production sites – All production facilities located within a lease holding or tenure.
Genetically engineered or genetically modified organisms (GMOs)-organisms whose genes have been manipulated outside of normal reproductive techniques like selective breeding.

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- ¹ Easton et al. 2002. Preliminary examination of contaminant loadings in farmed salmon, wild salmon and commercial salmon feed. *Chemosphere* 46: 1053-1074.
- ² Hites et al. 2004. Global assessment of organic contaminants in farmed salmon. *Science* 303: 226-229.
- ³ Hayward et al. 2004. PBDE and PCB levels correlated in wild caught and farm-raised fish fillets in the USA. *Organohalogen Compounds* 66:3994-3998.
- ⁴ Rawn et al. 2006. PCB, PCDD and PCDF residues in fin and non-fin fish products from the Canadian retail market 2002. *Science of the Total Environment* 359: 101-110.
- ⁵ Shaw et al. 2006. PCBs, PCDD/Fs, and organochlorine pesticides in farmed Atlantic salmon from Maine, Eastern Canada, and Norway, and wild salmon from Alaska. *Environ. Sci. Technol.* 40: 5347-5354.
- ⁶ <http://www.epa.gov/waterscience/fishadvice/volume2/index.html>
- ⁷ <http://www.health.gov/DietaryGuidelines/dga2005/report/>
- ⁸ <http://www.epa.gov/Region3/1668a.pdf>
- ⁹ <http://www.epa.gov/region3/1613.pdf>
- ¹⁰ Hites et al. 2004. Global assessment of organic contaminants in farmed salmon. *Science* 303: 226-229.
- ¹¹ State of Alaska. 2005. Fish Monitoring Program. <http://www.dec.state.ak.us/eh/vet/fish.htm>
- ¹² Bethune et al. 2006. Dietary intake of differently fed salmon: a preliminary study on contaminants. *European Journal of Clinical Investigation* 36(3): 193-201.
- ¹³ Gruemping et al. 2004. Levels of polychlorinated dibenzo(p)dioxins, dibenzofurans and dioxin-like PCBs in Irish farmed salmon. *Organohalogen Compounds* 66: 1977-1984.
- ¹⁴ Hites et al. 2004, op. cit.
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