FORMAL RECOMMENDATION BY THE
NATIONAL ORGANIC STANDARDS BOARD (NOSB)
TO THE NATIONAL ORGANIC PROGRAM (NOP)

Date: **3-29-07**

Subject: Aquaculture Standards Recommendation

Chair: **Andrea Caroe**

Recommendation

The NOSB hereby recommends to the NOP the following:

Rulemaking Action: XXX
Guidance Statement: _____
Other: _____

Statement of the Recommendation (including Recount of Vote)**:**

The NOSB recommends the attached Aquaculture Standards be adopted by the NOP

NOSB Vote: **Motion:** Kevin Englebert **Second:** Joe Smillie

Board vote: Yes - 12 No - 1 Abstain - 0 Absent - 2

Rationale Supporting Recommendation (including consistency with OFPA and NOP)**:**

The NOSB is proposing adding Aquaculture Standards to the Regulation. This is consistent with the OFPA: § 2102 (11) LIVESTOCK – The term "livestock" means any cattle, sheep, goats, swine, poultry, equine animals used for food or in the production of food, fish used for food, wild or domesticated game, or other non-plant life.

Response by the NOP:

Aquaculture Standards Recommendation
National Organic Standards Board
March 29, 2007

I. Introduction

The NOP and NOSB have received correspondence and public comments requesting consideration of adoption of organic standards for the production of aquatic species. To facilitate this mission, the NOP created an Aquatic Animal Task Force composed of knowledgeable members of the aquaculture and organic communities. Upon receipt of the task force report, the NOSB Livestock Committee recommends that the NOP implement rule changes to allow for the production of organic aquatic animals within the regulation.

Comprehensive restrictions on organic aquaculture production must be in place in order to comply with organic principles. To protect the environment and to maintain the organic integrity of products labeled as organic, the task force report specifies practices that protect these principles.

Within the task force report, there are several areas that the Livestock Committee would like further public comment. Specifically, the committee recommends further fact finding on sources of feed for aquatic animals that require a diet that includes fish. The task force recommended a temporary allowance for feed that included wild caught non-organic feed, but the committee believes that further input from the organic community is required in order to determine if this practice is consistent with organic principles.

Likewise, the Livestock Committee would like more dialog on the allowance of net pen operations for organic production. There appears to be conflicting opinion on whether this type of production is consistent with organic principles.

These sections of the task force report are not included in the recommendation for rule making. However, the Livestock Committee intends to enter into further rule making to add these sections upon completion of further dialog with the aquaculture industry and the organic community.

II. Background

A. Issues of Concern

Presently, NOP regulations state that fish are not included in the scope of the rule, which means that there can be no enforcement of fish products in the market place making “organic” claims. Since some foreign organic certification programs include fish standards, many products appear on the US market with an “organic” claim, which will continue until the NOP regulations include provisions for organic aquatic species. US fish producers have expressed interest in certifying their products as organic to meet the growing market demand.

Two areas in which the Livestock Committee requests further industry and organic community input prior to rule making include: temporary feed provision for species requiring fish in their diets, and, open net pens. The following sections of the task force report have been removed or edited from the committee recommendation pending further evaluation.

In regards to feed, the following sections have been removed:

(b) Fish meal from wild fish used as a feed additive or supplement may not exceed 12% by weight of feed, and fish oil from wild fish used as a feed ingredient may not exceed 12% by weight of feed as averages over the production cycle of the fish.

(c) Wild fish and wild aquatic animals used for producing fish meal and oil for aquaculture may not be certified or labeled as organic for human consumption unless allowed elsewhere in this rule. Whole, chopped, or minced wild fish that does not qualify in this section may not be used as feed.

(d) Fish meal or fish oil may not be sourced from any fishery classified by relevant state/provincial, national, or international fisheries authorities as follows: “at risk of reduced reproductive capacity;” “suffering reduced reproductive capacity;” “harvested outside precautionary limits;” “over-exploited;” “depleted;” “overfished;” “overfishing is occurring;” or any other comparable classification, or at significant risk of those conditions within the next recruitment cycle.

(i) Fish meal and fish oil from wild fish and other wild aquatic animals may be used as additives and supplements for organic aquaculture or livestock feeds as provided in this section for seven years after the date when organic standards for farmed aquatic animals are promulgated, and must be derived from wild sources that are in compliance with (c) and (d) may be used as supplements and additives under one of the following:

(1) wild fish, provided that the amount of such wild fish that goes into feeding the aquatic animals cannot exceed one pound of wild fish product fed for every pound live weight of cultured of aquatic animals at harvest; or

(2) carcasses, viscera, and trimmings from the processing of wild fish and other wild aquatic animals that are destined for human consumption. The portions of processed wild fish destined for human consumption may not be certified or labeled as organic unless provided elsewhere in this rule.

In regards to open net pens, the task force report has been edited as follows:

(j) Open water net-pens and enclosures are (not) permitted (at this time.) ~~where water depth, current velocities and direction, and other factors act to adequately disperse metabolic products in order to minimize accumulation of discharged solids on the sediments under net pens. However, water currents should not cause fish to expend excessive energy to swim and be unable to consume feed. Monitoring shall be employed to ensure that the natural assimilative capacity at the site and adjoining waters is not exceeded. Facility managers shall take all practical measures to prevent transmission of diseases and parasites between cultured and wild aquatic animals. Use of multiple species of aquatic plants and animals to recycle nutrients must be included in every Organic System Plan for net-pens. Except as may be provided in § 205.601 or § 205.602, chemical treatment of biofouling organisms on nets is not allowed. Any open water net pen or enclosure site must not have prohibited substances, as listed in § 205.105, applied for at least one year prior to beginning organic management.~~

C. Regulatory Framework

Under OFPA:

> § **2102 (11) LIVESTOCK** – The term "livestock" means any cattle, sheep, goats, swine, poultry, equine animals used for food or in the production of food, fish used for food, wild or domesticated game, or other non-plant life.

Clearly, Congress considers "fish used for food" to be within the authority of this statute.

From the 21 CFR Part 205:

> **205.2 Terms Defined**
> Livestock Any cattle, sheep, goat, swine, poultry, or equine animals used for food or in the production of food, fiber, feed or other agricultural-based consumer products; wild or domesticated game; or other non-plant life, except such term shall not include aquatic animals or bees for the production of food, fiber, feed, or other agricultural-based consumer products.

At the time of the implementation of the regulation, the NOP excluded aquatic animals from organic livestock production because there were no aquaculture production provisions provided.

Recommendation

The NOSB Livestock Committee recommends that NOP implement rule change to allow for the production of organic aquatic species.

The Livestock Committee recommends the following change to the existing regulation:

> **205.2 Terms Defined**
> Livestock Any cattle, sheep, goat, swine, poultry, or equine animals used for food or in the production of food, fiber, feed or other agricultural-based consumer products; wild or domesticated game; or other non-plant life, except such term shall not include ~~aquatic animals or~~ bees for the production of food, fiber, feed, or other agricultural-based consumer products.

The Livestock Committee recommends the following addition to the regulation:

§ 205.2 Terms defined.

The following definitions shall be added to § 205.2 Terms defined.

Aquaculture. The propagation and rearing of aquatic animals and plants.

Aquaculture facility. Any land, structure, or other appurtenance used for aquaculture. Such term includes but is not limited to any laboratory, hatchery, rearing pond, tank, raceway, net pen, cage, raft, longline, geographically defined seafloor, or other structure or defined boundary used in aquaculture.

Aquaculture product. Any product of aquaculture, including but not limited to whole alive or dead aquatic animals, gutted fish, fillets and other forms of raw or processed meat, eggs for human consumption, eggs for reproduction, skin and other animal parts, and alive, fresh and dehydrated aquatic plants, either whole or processed. By-products from aquatic animals grown in aquaculture, such as fish meal, oil, silage, and hydrolyzed offal, are included.

Aquatic animal. Any finfish, mollusc, crustacean, or other aquatic vertebrate or invertebrate grown in fresh, brackish or saltwater, except amphibians, reptiles, birds and mammals.

Aquatic animal broodstock. Sexually mature aquatic animals used to produce progeny that may be incorporated into an organic aquaculture production system.

Aquatic plant. Any plant grown in an aquaculture facility, including microscopic or macroscopic algae, and excluding vascular aquatic plants such as watercress, rice, water hyacinth, and hydroponically produced vascular plant crops.

Aquaculture production system. A process for growing aquatic animals and plants in an aquaculture facility.

Bivalve molluscs. Molluscan shellfish species (Phylum *Mollusca,* Class *Pelecypoda* commonly called bivalves) with two outer, hinged shells such as oysters, clams, mussels and scallops, but not including gastropods and cephalopods.

Coldwater finfish. Salmonids, cod, marine flatfish and other species not considered in this section as warmwater finfish.

Fish meal. Dried ground tissue of undecomposed whole fish or fish cuttings, either or both, with or without the extraction of part of the oil.

Fish oil. Oil from rendering whole fish, fish cuttings, or cannery waste alone or in combination.

Fish silage. A mixture of solids and liquids obtained by the breakdown of fish tissue using natural enzymes with or without addition of acids or bases to control spoilage and to enhance enzyme activity.

Finfish. Aquatic vertebrate animals consisting of bony fish (*Telestomi*), not including mammals, birds, amphibians and reptiles. In this section, coldwater finfish include salmonids, cod, marine flatfish not considered warmwater finfish. Warmwater finfish have optimum temperatures for growth between 25 and 30 C. Examples include catfish, tilapia, and paddlefish.

Metabolic products of aquatic animals. Solid and dissolved compounds released by aquatic animals during growth in an aquaculture production system.

Minimum nutritional requirements. Those that support optimum growth, health and reproduction in fish in all life stages of aquatic animals cultured in all types of rearing systems.

Monosex stocks. Populations of aquatic animals of one sex obtained by artificially induced or natural processes, or by manual selection.

Natural assimilative capacity. The ability of an aquatic ecosystem within and surrounding an aquaculture facility to assimilate and process effluents discharged from the facility without reduction in that ecosystem's ability to function and maintain life.

Persistent bioaccumulative toxins (PBT). Chemicals that resist breakdown and are persistent in the environment, bioaccumulate in food chains through consumption or uptake, and are a hazard to human health or wildlife. A term related to PBT is POP (persistent organic pollutant) and, for the purposes of these standards, the terms are interchangeable.

Polyploid. Aquatic animals with more than two sets of homologous chromosomes. Most aquatic animals are naturally diploid (2n). Triploid aquatic animals are typically sterile (non-reproductive) and tend to grow faster than diploid aquatic animals.

Reportable pathogens. Pathogens of aquatic animals whose diagnosis must be reported, by law, to pertinent state or federal authorities. Included are pathogens listed as Reportable by the Office Internationale Epitozooties.

Shellfish. Aquatic invertebrate animals including molluscs and crustaceans.

Sustainability. Meeting the needs of the present without compromising the ability of future generations to meet their own needs (1987 Brundtland Report). Sustainably managed resources are those where long-term productivity is maintained to meet human needs while simultaneously conserving biodiversity, environmental quality, and ecosystem services. Ecosystem services are functions provided by ecosystems such as nutrient cycling, flood control, and more. Their importance was highlighted in the 2005 Millennium Ecosystem Assessment report, which was the result of a major international effort involving a number of agencies.

Wild fish. Any species of fish or shellfish, raw or processed, harvested from wild sources used for human food or in animal feeds, including feeds for aquatic animals.

§ 205.250 Aquaculture general.

(1) Aquatic animals, aquatic animal products, aquatic plants, and aquatic plant products to be sold, labeled or represented as "100 percent organic," "organic," or "made with organic (specified ingredients or food group(s))," must be produced and handled in accordance with this section: Except that the requirements of Sections § 205.236 through § 205.239 shall not apply to the production of aquatic animals or aquatic animal products and the requirements of Sections § 205.202 through § 205.206 shall not apply to the production of aquatic plant or aquatic plant products.

(2) Metabolic products of aquaculture species are not considered animal manure under § 205.2 Terms Defined, Manure, and § 205.239 (c) Livestock Living Conditions.

(3) Metabolic products of one species are recognized as organic resources for one or more other species in an aquaculture production system. The Organic System Plan of facilities producing aquatic animals must consider measures to recycle or biologically process metabolic products. Where feasible, the Organic System plan must include the polyculture of two or more different species grown in the same body of water, and the integration of additional species as water moves through the aquaculture facility or into adjoining discharge areas.

(4) The feasibility of using water discharges and filtered metabolic products as nutrients for vascular plants in agricultural crops and constructed wetlands must be considered in Organic System Plans. The quantities of such discharges and filtered products applied shall not exceed the requirements of targeted plants in the receiving area, and shall not be discharged into unplanned areas. Vascular agriculture crops using nutrients from certified organic aquaculture operations may be certified organic if in compliance with other regulations in this Subpart.

(5) Organic System Plans for aquaculture facilities must provided for the health and welfare of aquatic animals, preclude prohibited substances, and prevent contamination of aquaculture products from environmental sources.

(6) Biodiversity of natural aquatic ecosystems, functional integrity of aquatic environments, and the quality of adjoining aquatic and terrestrial ecosystems must be protected. All aquatic animals possessed and grown at an aquaculture facility must be in compliance with all applicable laws.

(7) Measures shall be taken to prevent escapes of cultivated animals and plants from the aquaculture facility and to document any that do occur. These measures shall be documented in the Organic System Plan.

(8) By-products from the production of aquatic animals, such as fish meal, fish oil, silage and hydrolyzed offal, produced in an organic aquaculture production system, and handled in accordance with organic handling requirements, may be labeled organic.

(9) Aquaculture facilities shall be designed, operated and managed in a manner that seeks to maximize the welfare of cultured aquatic animals, minimizes the stress on those animals, and prevents the spread of disease within the facility and to all adjoining ecosystems and native fish species.

§ 205.251 Origin of aquaculture animals.

(a) Aquatic animals grown in aquaculture to be sold as organic must have been under continuous organic management beginning no later than the second day after final larval metamorphosis and the beginning of exogenous feeding, where applicable by species, or beginning no later than when 5% of total market weight has been achieved, whichever is greater. However, in either case, substances prohibited in § 205.602 and § 205.604 are not allowed during earlier life stages.

(b) Aquatic animals that are removed from an organic production system and subsequently managed on a non-organic facility may not be sold, labeled, or represented as organically produced.

(c) Broodstock that has not been under continuous organic management may not be sold, labeled, or represented as organic slaughter stock.

(d) The producer of an organic aquaculture facility must maintain records sufficient to preserve the identity of all organically managed animals (by lot) and edible and nonedible animal products to assure reliable traceability from farm to market.

(e) Production of triploid aquatic animals by any method including but not limited to the application of temperature or pressure shock after fertilization and by crossing tetraploids with diploids is prohibited for fish to be sold as organic.

(f) Culture of monosex stocks of aquatic animals obtained by direct treatment with steroidal or other hormones (including methyl-testosterone) or by other direct-treatment artificial induction methods, including use of excluded methods, is prohibited.

(g) Cultivation of any genetically modified aquatic animal or an organism produced by any other excluded method provided in § 205.2 Terms defined, is prohibited.

(h) In cases where hatchery progeny of aquatic animals are not commercially available, broodstock may be collected from the wild provided that they are collected in a sustainable manner, as documented in the Organic System Plan, and where appropriate, in compliance with all federal and state regulations, and in collaboration with government agencies, to assure that natural populations and the collected individuals are protected and that biodiversity in the ecosystem is supported.

§ 205.252 Aquaculture feed.

(a) Feeds and feeding practices must meet the minimum nutritional requirements of the aquatic animal. However, fish meal and fish oil produced from wild fish and other wild aquatic animals that do not qualify as provided in this section cannot be used in organic production of aquatic animals.

(b) Use of aquatic animal feeds must minimize the environmental impact of released nutrients on receiving waters and adjoining ecosystems as documented in the Organic System Plan.

(c) Aquatic animals must be provided with their natural foods consistent with the need to optimize health and growth of the aquatic animal. This includes live foods and the sources of ingredients in formulated feeds as allowed in the rule.

(d) Feeds for aquaculture products for human consumption may not contain lipids from sources other than fish oil or omega-3 fatty acids produced by organic microorganisms or plants, except that other lipids from organic sources may be provided in feeds for aquatic animals that have a specific dietary requirements for such ingredients to the extent necessary to meet the minimum requirement for that lipid in that aquatic animal.

(e) Aquaculture feeds must be composed of feed ingredients that are certified organic, except that nonsynthetic substances and synthetic substances allowed under § 205.603 may be used as feed additives and supplements.

(f) Aquaculture feeds may include fish meal and fish oil derived from organically raised aquatic animals or algae without limitation according to an Organic System Plan, providing the meal and oil is produced from aquatic animals of a different genus than the aquatic animal being fed.

(g) Silage and lipids produced from organic fish that is enzyme-processed, or produced with acids and bases that are organically certified or approved in § 205.603 for fish emulsion or other purposes, may be certified organic and incorporated into organic aquaculture feeds without limitation.

(h) Organic aquaculture feeds may include meals and oils containing essential fatty acids produced by processes allowed in organic production.

(i) Nutritional pigment compounds that appear on 205.603 or are organically produced and allowed by the U.S. Food and Drug Administration for inclusion in aquaculture feeds may be used.

~~(j) Manure from organic terrestrial animals that is composted in compliance with § 205.203 may be used to fertilize aquaculture ponds in an organic production system. Composted manure must not be applied within 30 days of harvest of aquatic products for human consumption. Manure, whether composted or not, shall not be applied to aquaculture production systems other than ponds.~~

(k) The producer of organic aquatic animals shall not:

(1) incorporate or introduce any type of antibiotic or hormone in feeds, the water supply, or the environment;

(2) provide feed supplements or additives in amounts above those needed for adequate nutrition and health maintenance of the species at its specific stage of life;

(3) feed by-products from mammalian or poultry slaughter;

(4) use feedstuffs extracted with synthetic solvents not approved on the National List;

(5) use feed, feed additives, and feed supplements in violation of the U.S. Federal Food, Drug, and Cosmetic Act; or

(6) use any genetically modified organism, or any organism produced by any other excluded method provided in § 205.2 Terms defined, or product thereof, as a feed ingredient.

§ 205.253 Aquaculture health care.

(a) The aquaculture producer must establish and maintain preventive health care practices that optimize animal welfare and minimize animal stress and pain by implementing the following procedures and practices:

(1) provision of a source of nutrition inclusive of live and formulated feeds sufficient to meet minimum nutritional requirements, including vitamins, minerals, protein and/or amino acids, fatty acids, energy and other necessary dietary or nutritional components;

(2) maintenance of life-supporting water rearing conditions, including control of potentially toxic metabolic compounds (ammonia and carbon dioxide) within known physiological tolerance ranges for the species, and the maintenance of water temperature, oxygen concentration, and pH within known life-supporting values for the species and the prevention of extended excursions to stressful extremes. Efforts to maintain such conditions must be documented by a monitoring and record-keeping program for these and other species specific key water quality parameters that affect health. The frequency of such monitoring shall depend on the culture system, site, species, life stage, and environmental characteristics;

(3) establishment of biosecurity measures known to reduce risk of entry of pathogens into the aquaculture production system. These may include such measures as allowing only entry of broodstock tested and found free of reportable pathogens, animal vector control, and limited human entry by use of fences or barriers and locked entry points. In recirculating systems sanitation procedures must include scheduled removal of accumulated particulate organic matter. Culture water used in the system must be from a source tested and determined free of reportable pathogens and free of known vectors of diseases or disinfected to remove such infectious disease agents. In open water systems, if animals are potentially exposed to known infectious agents, this risk may be mitigated if approved vaccines and vaccination procedures are available. Biosecurity measures should not be used to justify growing conditions that compromise aquatic animal health from elevated stress and associated immunosupression; and

(4) administration of vaccines, other veterinary biologics, and approved natural supplements, such as supplementation or treatment of healthy animals with beneficial bacteria, appropriate to the species and location.

(b) When preventive practices and veterinary biologics are inadequate to prevent disease, a producer may administer synthetic medications, provided that such medications are allowed under § 205.603.

(1) parasiticides allowed under § 205.603 may be used on aquatic broodstock, but none that are to be sold, labeled, or represented as organically produced.

(c) The producer of organic aquaculture products must not:

(1) sell, label, or represent as organic any aquatic animal or edible product derived from any aquatic animal treated with antibiotics, any substance that contains a synthetic substance not allowed under § 205.603, or any substance that contains a nonsynthetic substance prohibited in § 205.604;

(2) administer any type of animal medication or therapeutant, other than vaccination, in the absence of illness;

(3) administer hormones for growth promotion, prevention of reproductive maturation, and sex reversal;

(4) administer synthetic parasiticides except as allowed under § 205.603;

(5) administer animal drugs in violation of the U.S. Food and Drug Administration regulations, and vaccines in violation of U.S. Department of Agriculture regulations; and

(6) withhold medical treatment from a sick animal in an effort to preserve its organic status. All appropriate medications must be used to restore an animal to health when methods acceptable to organic production fail. Lots of aquatic animals treated with a prohibited substance must be clearly identified by lot number and shall not be sold, labeled, or represented as organically produced. Except for earthen ponds not lined with impervious barriers, facilities containing aquatic animals during medical treatment are not required to undergo conversion periods specified in paragraphs (k), (l) and (m) of § 205.255 Aquaculture facilities.

§ 205.254 Aquaculture living conditions.

(a) Aquaculture systems must establish and maintain living conditions as documented in the Organic System Plan that accommodates the health and natural behavior of the aquatic animals, including:

(1) an environment operated within the tolerance limits characteristic of the aquatic animal and stage of development by monitoring and maintaining water quality appropriate for the production system and species, including temperature, pH, salinity, photoperiod, dissolved oxygen, ammonia, and nitrite concentrations, without sudden changes or prolonged exposure to extremes; and

(2) containment that allows the animals:

(i) to exercise swimming behavior within the culture unit;

(ii) minimal potential for injury, and.

(iii) appropriate population or biomass densities that promote natural behaviors and limits aggressive and dominant behaviors from other aquatic animals.

(b) The culture system must be managed to minimize the risk of losses of cultured stock, stress to cultured aquatic animals caused by predators, and harm to predators. Organic aquaculture facilities must develop an integrated Predator Deterrence Plan as described in the Organic System Plan that identifies potential predators, appropriate deterrence methods, how predator behavior will be modified by application of deterrence methods, documentation of control methods and effects, contingencies for failure to achieve objectives, and how plan implementation conserves biodiversity in the ecosystem adjacent to and including the aquaculture facility.

(c) Non-organic aquatic animals may be used in aquaculture production systems for controlling pests, such as weeds, snails, algae, and parasites. Triploid animals may be employed provided that the animals are legal to culture, not labeled organic, and readily separated at harvest from the aquatic animals under organic management.

§ 205.255 Aquaculture facilities.

(a) Construction and operation of organic aquaculture facilities shall not compromise the structure and function of adjoining aquatic and terrestrial ecosystems as described in the Organic System Plan.

(b) Water sources for aquaculture facilities must be selected carefully and managed to avoid environmental contaminants that can harm human health.

(c) Facility boundaries shall be identified clearly.

(d) Organic aquaculture facilities shall provide buffers from potential contamination sources including pesticide drift and other possible contaminants from conventional aquaculture as documented in the Organic System Plan.

(e) Pond berms and tank tops shall be designed and constructed to prevent contamination from the environment during a 100-year flood event.

(f) Potentially adverse environmental impacts from aquaculture production must be minimized. The rate of effluent discharge must not exceed the natural assimilative capacity of an area within 25 meters of the site boundary. For the purpose of this paragraph, the "site" described in the Organic System Plan is an identified area of land or a water body owned by the facility operator or licensed or leased by government authorities or other parties for the aquaculture facility.

(g) Every organic aquaculture facility must develop a Nutrient Management Plan that evaluates the technical and economic feasibility of options appropriate for the culture system to recover solid and dissolved waste nutrients in other plant and animal crops. Options may include using settled solids as a soil amendment, suspended solids to grow filter-feeding aquatic animals, and dissolved nutrients as a nutrient source for terrestrial crops, aquatic plants, or crops grown hydroponically.

(h) Construction and operation of aquaculture facilities shall not impair water quality to require a change in the designated use of receiving waters and must not salinize or otherwise contaminate soils.

(i) Aquaculture facilities must be managed with all reasonable security measures (mechanical, physical, and biological barriers) with the goal of eliminating escapes caused by predators, adverse weather conditions (including floods), facility malfunction, facility damage, or other causes. Facilities must be operated with preventative measures against possible escapes into the natural environment of the aquatic animals in production. The Organic System Plan must describe measures to prevent escape, procedures to detect and document escapes should they occur, and actions to be undertaken in the event of escape.

(j) Open water net-pens and enclosures are not permitted at this time.

(k) Production systems with direct soil-water contact are allowed, provided that a conversion period of 36 months from the date of the last application of prohibited substance immediately preceding the harvest of aquatic animals occurs under organic management before production can be certified organic.

(l) Production systems with containment units of plastic, fiberglass, metal or concrete surfaces are allowed, provided that the unit is filled with water to its capacity and then drained before production can be certified organic.

(m) Recirculating systems are permitted if the system supports the health, growth, and well-being of the species, including:

(1) stocking or biomass density appropriate for the particular species being produced to ensure animal health and overall well-being, including the natural behavioral characteristics of the species; and

(2) the provision of emergency life support systems to provide appropriate maintenance of water quality, especially dissolved oxygen levels, in the event that primary life support systems fail.

§ 205.256 Aquaculture additional [Reserved].

§ 205.257 Molluscan shellfish [Reserved].

§ 205.258 Farmed aquatic plants.

(a) Aquatic plants may be grown in organic systems for feed for aquatic species that utilize algae for food, provided that:

(1) any pond or containment vessel from which algae are intended to be represented as organic must have had no prohibited substances, applied for 36 months immediately preceding harvest of the crop;

(2) aquatic plants may be provided dissolved macro-nutrients and micro-nutrients, including trace minerals, chelating compounds, and vitamins listed in § 205.601; however, the dissolved amounts shall not exceed those necessary for healthy growth of the plants, and such culture media shall be disposed of in a manner that does not adversely impact the environment; and

(3) the pond or containment vessel has berm elevations with distinct defined boundaries and buffer zones with runoff diversions to prevent the unintended application of a prohibited substance into the pond or containment vessel, or allow contact with a prohibited substance applied to adjoining land that is not under organic management.

(b) ~~Manure from terrestrial animals may not be used to fertilize aquatic plants unless composted as provided under § 205.252 Aquaculture feed~~.

§ 205.259 Harvest, transport, post harvest handling, and slaughter of aquatic animals.

(a) Handling of stock during harvesting, transport, and slaughtering operations must be carried out with minimal disturbance and stress to the aquatic animal.

(b) Adverse environmental impacts associated with harvest operations must be minimized

(c) Aquatic animals transported to slaughter and processing facilities, or to live haul markets, shall be transported under conditions appropriate to the species and in such manner to minimize the adverse effects of:

(1) water quality;

(2) time spent in transport;

(3) animal density;

(4) metabolic substances; and

(5) escape.

(d) Fish should be held in high quality water for the duration of food deprivation prior to transport and slaughter for a period not to exceed the time necessary to allow clearance of stomach and intestine contents.

(e) Just prior to slaughter and before or immediately after they are removed from water, finfish must be stunned by a method that renders them instantly insentient and maintains insentience until death.

(1) Permitted procedures include:

(i) concussion to the head promptly followed by prompt severing of the gill arches or decapitation;

(ii) electrical stunning sufficient to achieve insentience immediately followed by severing of the gill arches or decapitation;

(iii) electrocution with electric current sufficient to achieve insentience; or

(iv) ice slurry for warmwater marine finfish; provided that this method will be only permitted for five years after the date when organic standards for farmed aquatic animals are promulgated as an amendment to the Final Rule.

(2) Prohibited slaughtering methods for finfish include those that use:

(i) ice or ice slurry except as provided in (iv) above;

(ii) carbon dioxide;

(iii) synthetic anesthetics, including MS-222;

(iv) natural plant anesthetics, including clove oil, not approved by the U.S. Food and Drug Administration for this purpose;

(v) suffocation or asphyxiation (leaving fish to die in air); or

(vi) exsanguination (bleeding) without stunning.

(f) Slaughter using ice or ice slurry is allowed for crustaceans, molluscs, and other aquatic animals that are non-sentient.

(g) The disposal of harvest water, blood water, viscera and disinfectant should pose no threat to wild or farmed fish or the environment and comply with existing laws.

Moved: Kevin Engelbert **Second:** Jeff Moyer

Committee vote

Yes- 6 No- 0 Abstentions- 0 Absent- 0

Minority opinion

None

Conclusion

The NOSB Livestock Committee recommends that the NOP implement rule changes to allow for certification of aquatic species and to engage the industry and the organic community in dialog for further rule development.

Appendix

RESPONSES TO PUBLIC COMMENTS
WITH
INTERIM FINAL REPORT
(REVISED)

Submitted by the

Aquatic Animal Task Force

Aquaculture Working Group

to the

National Organic Standards Board

1 February 2007

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Executive Summary

At the recommendation of the National Organic Standards Board (NOSB), and after public notice, the National Organic Program (NOP) on 26 May 2005 appointed a 12-member Aquaculture Working Group (AWG) of an Aquatic Animal Task Force. The AWG was given the charge to draft production, handling and labeling standards for organic aquaculture.

On 13 January 2006 the AWG submitted an Interim Final Report to the NOP.[1] The NOP then sought public comments on that report,[2] which were received and posted for public review.[3] The report was then officially received by NOSB at their 17-19 April 2006 meeting and the NOSB Livestock Committee was requested to develop draft standards for consideration by the full NOSB for recommendation to the Secretary of Agriculture.

On 8 September 2006, the Livestock committee invited further public comments on questions that emerged during their review of the Interim Final Report and the public comments that had been received earlier.[4] The questions for which further public comments were invited concerned:

1. species or production method specific standards
2. impact on the environment
3. differences between organic and conventional aquaculture standards
4. use of fish meal and fish oil
5. sources of fish meal and fish oil
6. slaughter by-products in aquaculture feed.

Further public comments were received to these additional questions in writing[5] and in oral testimony.[6] Responses by AWG to these NOSB questions are *Aquatic Animals Task Force: Aquaculture Questions* and *Aquatic Animals Task Force: Response to Invitation – Species* (Footnote 5).

This document presents the responses of the AWG to public comments. It also includes a revised draft of proposed amendments to the Final Rule pertaining to organic aquaculture based on public comments and AWG deliberations since submission of the initial Interim Final Report. This AWG report remains "interim" because AWG continues to work on development of draft standards for organic bivalve molluscs.

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[1]http://www.ams.usda.gov/nop/TaskForces/AATFInterimFinalReport.pdf
[2]http://www.ams.usda.gov/nop/TaskForces/AATFInterimaFinalReportPubComnt.pdf
[3]http://www.ams.usda.gov/nop/PublicComments/AqauculturеWorkingGroupInterim/PublicCommentsAquaWGInterim.html
[4]http://www.ams.usda.gov/nosb/lscommRMR/recommendations/Oct06MeetingRecs/LC-FNLInvitationAWG090806.pdf
[5]http://www.ams.usda.gov/nosb/PublicComments/Oct06/Livestock.html
[6]http://www.ams.usda.gov/nosb/transcripts/Oct2006/10_18_06.pdf

Overview of Public Comments

In all, 62 written public comments were received in response to the April 2006 solicitation and another 32 from the October 2006 solicitation. Two comments in this latter set were from the AWG, leaving 30 received from the public.

Upon careful review, the AWG proposes changes in the Interim Final Report based on public and NOSB-member comments and further AWG deliberations. These are presented immediately below. The original language that is now omitted is indicated by strike-through.

Following these changes is a detailed discussion of the various issues raised by various comments. In some cases the AWG recommends amendment to the Interim Final Report and in other cases explains why in its judgment the comment is not applicable. At the end of this document, the revised Interim Final Report is included that incorporates numerous changes emanating from the 92 public comments received.

§ 205.2 Terms defined

Aquatic animal. Any finfish, mollusc, crustacean, or other aquatic vertebrate or invertebrate grown in fresh, brackish or saltwater, except amphibians, reptiles, birds and mammals.

Aquatic plant. Any plant grown in an aquaculture facility, including microscopic or macroscopic algae, and excluding vascular aquatic plants such as watercress, rice, water hyacinth, and hydroponically produced vascular plant crops.

Bivalve molluscs. Molluscan Shellfish species (Phylum *Mollusca*, Class *Pelecypoda* commonly called bivalves) with two outer, hinged shells such as ~~including~~ oysters, clams, mussels and scallops, but not including gastropods and cephalopods.

Coldwater ~~and coolwater~~ finfish. Salmonids, cod, marine flatfish and other species not considered in this section as warmwater finfish.

Fish meal. ~~Fish meal is the~~ Dried ground tissue of undecomposed whole fish or fish cuttings, either or both, with or without the extraction of part of the oil.

Fish oil. ~~Fish oil is the~~ Oil from rendering whole fish, fish cuttings, or cannery waste alone or in combination.

Finfish. Aquatic vertebrate animals consisting of bony fish (*Telestomi*), not including mammals, birds, amphibians and reptiles.

Reportable pathogens. Pathogens of aquatic animals whose diagnosis must be reported, by law, to pertinent state or federal authorities. Included are pathogens listed as Reportable by the Office Internationale Epitozooties.

Polyploid. Aquatic animals with more than two sets of homologous chromosomes. Most aquatic animals are naturally diploid (2n). Triploid aquatic animals are typically sterile (non-reproductive) and tend to grow faster than diploid aquatic animals.

Proposed § 205.250. Aquaculture General.

(6) Biodiversity of natural aquatic ecosystems, functional integrity of aquatic environments, and the quality of surrounding aquatic and terrestrial ecosystems must be protected. All aquatic animals possessed and grown in an aquaculture facility must be in compliance with all applicable ~~local, state, and national~~ laws.

(9) Aquaculture facilities shall be designed, operated and managed in a manner that seeks to prevent the spread of disease within ~~in~~ the facility and to surrounding ecosystems and ~~to~~ native fish species.

Proposed § 205.251. Origin of Aquaculture Animals.

(h) In cases where hatchery progeny of aquatic animals are not commercially available, broodstock may be collected from the wild provided that they are collected in a sustainable manner, as documented in the Organic System Plan, and where appropriate, in compliance with all applicable federal and state regulations, and in collaboration with government agencies, to assure that natural populations and collected individuals are protected and that biodiversity in the ecosystem is supported.

Proposed § 205.253 Aquaculture Health Care.

(a) (1) Provision of a source of nutrition ~~or~~ inclusive of live and formulated feeds sufficient to meet minimum nutritional requirements, including vitamins, minerals, protein and/or amino acids, fatty acids, and energy;

(a) (4) Administration of vaccines, other veterinary biologics, and approved natural supplements, such as supplementation or treatment of healthy animals with ~~endemic~~ beneficial bacteria, appropriate to the species and location.

(c) (3) Administer hormones for growth promotion, prevention of reproductive maturation and sex reversal.

Proposed § 205.254 Aquaculture Living Conditions.

(b) The culture system must be managed to minimize the risk of losses of cultured stock and stress to cultured aquatic animals caused by predators, and harm to predators. Organic aquaculture facilities must develop an Integrated Predator Deterrence plan that identifies potential predators, appropriate deterrence methods, how predator behavior will be modified by application of deterrence methods, contingencies for failure of the plan to achieve objectives, ~~and~~ documentation of control methods and effects, and how plan implementation conserves biodiversity in the ecosystem adjacent to and including the aquaculture facility. ~~Examples of such control measures include site selection, physical barriers, repellents, and legal predator deterrence methods. Lethal measures may be taken only when predators threaten human safety or are necessary for predator welfare (e.g. birds are entangled and injured) and must include appropriate documentation. Lethal measures must be in compliance with local laws and the laws of the United States.~~

Proposed § 205.255 Aquaculture Facilities.

(f) Potentially adverse environmental impacts from aquaculture production must be minimized. The rate of effluent discharge must not exceed the natural assimilative capacity ~~for inorganic and organic compounds~~ of an area within 25 meters of the site boundary ~~nor contribute significantly to environmental beyond 25 meters of the site boundary.~~ For the purpose of this paragraph ~~degradation of water quality and~~, the "site" described in the Organic System Plan is an identified area of land or a water body owned by the facility operator, or licensed or leased by government authorities or other parties for the aquaculture facility.

(h) Construction and operation of aquaculture facilities shall not impair water quality to require a change in the designated use of receiving waters and must not salinize or otherwise contaminate soils. ~~Facilities should not significantly impact freshwater quality or supply and should not salinize or otherwise contaminate soils.~~

(i) ~~Cultured organisms that are species-distinct or genetically-distinct populations from native organisms in adjacent aquatic environments~~ Aquaculture facilities must be managed with all reasonable ~~appropriate~~ security measures (mechanical, physical, and biological barriers) with the goal eliminate ~~to minimize eliminate to the extent practical~~ escapes due to predators, adverse weather conditions (including floods), facility malfunction, ~~or~~ facility damage, or other cause. The facilities must include preventative measures against possible escapes into the natural environment of the aquatic animals in production~~, including during local floods~~. The Organic System Plan ~~A containment management plan~~ must describe measures to prevent escape, procedures to detect and document escapes should they occur, and actions to be undertaken in the event of escape.

(j) Open water net-pens and enclosures are permitted where water depth, current velocities and direction, feeding rate, and other factors act to disperse metabolic products in order to minimize accumulation of discharged solids on the bottom sediments under the net pens. However, water currents ~~must~~ should not ~~be excessive to~~ cause the fish to expend excessive energy to swim and to be unable to consume food. Monitoring shall be employed to ensure that the natural assimilative capacity at the site is not overburdened. Facility managers shall take all practicable measures to prevent transmission of diseases and parasites between cultured and wild aquatic animals. Use of multiple species of aquatic plants and animals to recycle nutrients must be included in every Organic System Plan ~~management plan~~. Except as may be provided in § 205.601 or § 205.602, chemical treatment of biofouling organisms on nets is not allowed. ~~An organic conversion period of at least one year, or one crop cycle, whichever is less, is required.~~ Any open water net pen or enclosure site must not have prohibited substances, as listed in § 205.105, applied for at least one year prior to beginning organic management.

(m) Production systems with containment vessels of plastic, fiberglass, metal or concrete surfaces are allowed provided that a conversion period of one year or one crop cycle, whichever is less, occurs under organic management before production can be certified organic.

(n) (4) Stocking density levels ~~that take into consideration~~ appropriate for the particular species being produced that ensure animal health and overall well-being, including the natural ~~schooling~~ behavioral characteristics of the species.

Responses to Public Comments

General comments

Species-specific standards: A number of comments were received that standards should be specific for each aquatic animal species or groups of species produced in aquaculture, and for each different production system employed. It was suggested that such specific standards apply to levels of fish meal allowed in diets, animal health conditions, livings conditions, and stocking densities for aquatic animals.

The Aquaculture Working Group (AWG) carefully considered such an approach at the outset. However, the standards for livestock in the Final Rule, while applicable to a wide range of terrestrial animals, are not animal specific, except in a few paragraphs that apply to poultry and dairy production. In the case of aquaculture, the only exception provided in the Interim Final Report is for bivalve molluscs, which are very different from other aquatic animals and warrant specific consideration.

At this time, the AWG is not proposing production system-specific standards. Many different species can be cultured in many different ways. Channel catfish can be cultured in earthen ponds, raceways, and net pens. Tilapia can be cultured in earthen ponds, warmwater raceways, freshwater and saltwater net pens, and recirculating systems. Salmonids can be cultured in net pens and raceways. A net pen-standard would thus have to consider warmwater and coldwater species and freshwater and marine environments, each difference requiring specific standards.

Similar to objections to species-specific standards, rational production system-specific standards would be difficult to formulate given the diversity of species cultured in a specific culture system.

AWG suggests, however, that species-specific and system-specific standards may be warranted in certain cases at some time in the future. Interpretations of some proposed standards may vary considerably between growers and certifiers. In addition, some international standards are more specific.

The NOP is considering modifying existing livestock standards in the Final Rule for greater specificity. This major issue must be carefully reconsidered as NOP determines whether species-specific and system-specific polices should apply to these proposed standards for organic aquaculture.

Harmonization with international standards. Comments were received seeking greater international harmonization of organic aquaculture standards. The White Paper submitted to the NOP by the National Organic Aquaculture Working Group (NOAWG) began with a thorough review of a wide range of international standards. Where deemed appropriate for US production various international provisions were followed. In some other cases more rigorous standards are proposed. A major difference in some cases is the matter of species-specific and production system-specific standards as discussed above.

Nutrient recycling. Some comments suggested that recycling of nutrients in aquaculture should be required. This is a well-established principle of organic agriculture that is explicitly acknowledged in the AWG Interim Draft Report. The AWG proposal provides for nutrient recycling with § 205.255 Aquaculture facilities (g) requiring a nutrient management plan for every organic aquaculture facility. In the case of net pen operations (k), use of multiple species of aquatic plants and animals is required to recycle nutrients.

Act does not allow animals other than fish. One commenter asserted that the legislative history of the Act (Organic Food Production Act of 1990) does not provide any indication that Congress meant to expand the term "fish" to include other "aquatic animals" such as molluscan shellfish. It is the interpretation of AWG that the term "fish" includes molluscs and crustaceans for which standards are proposed in the Interim Final Report.

Two Federal precedents provide clear guidance with the term "fish". The National Aquaculture Act of 1980 (Public Law 96-362, 94 Stat. 1198, 16 U.S.C. 2801, et seq.) provides the following definitions:

SEC. 3.[6] As used in this Act, unless the context otherwise requires--

(1) The term "aquaculture" means the propagation and rearing of aquatic species in controlled or selected environments, including, but not limited to, ocean ranching (except private ocean ranching of Pacific salmon for profit in those States where such ranching is prohibited by law).

(2) The term "aquaculture facility" means any land, structure, or other appurtenance that is used for aquaculture and is located in any State. Such term includes, but is not limited to, any laboratory, hatchery, rearing pond, raceway, pen, incubator, or other equipment used in aquaculture.

(3) The term "aquatic species" means any species of finfish, mollusk, crustacean, or other aquatic invertebrate, amphibian, reptile, or aquatic plant.

[6] 16 U.S.C. 2802.

The January 28, 1994 FDA Federal Register Proposed Rule: To establish procedures for safe processing and importing of fish and fishery products provides:

FDA Definition of Seafood

> The term "fish" includes all fresh or saltwater finfish, molluscan shellfish, crustaceans, and other forms of aquatic animal life. Birds are specifically excluded from the definition because commercial species of birds are either non-aquatic or, as in the case of aquatic birds such as ducks, regulated by USDA. Mammals are also specifically excluded because no aquatic mammals are processed or marketed commercially in this country.

Both the US Aquaculture Act of 1980 and the FDA rule defining seafood include finfish, molluscan shellfish, crustaceans and other aquatic animal and plant life.

Molluscs, including gastropods. Other comments assert that molluscan shellfish (e.g., oysters) must be included as well as gastropods (e.g., abalone) and cephalopods (e.g., octopus and squid). An entire section devoted to bivalve molluscs in the Interim Final Report is under development. As for gastropod and cephalopod molluscs, their culture is possible under other sections in the Interim Final Report.

Microbial processes. One commenter indicated that there are no standards for organic certification of microbial processes. This is incorrect because microbial production of beer, wine, bread, miso, vinegar, and other food items can be certified as organic in the Final Rule.

Enforcing US laws in foreign jurisdictions. Several concerns were raised that compliance with the laws of the United States is un-enforceable for foreign producers. To the extent that this is true, this situation is not unique with aquaculture. As with terrestrial agriculture, it is the responsibility of the accredited certifier to assure compliance with the Final Rule in its entirety, including instances where compliance with US laws is mandated.

Impact on wild fish stocks. Comments were received to the effect that "Wherever possible, facilities must be designed and operated to enhance biological diversity, mitigate environmental harm, and improve recovery of wild fish stocks." be added to (e). There is no requirement in the Act or Final Rule requiring a farmer to enhance and improve recovery of wildlife in adjacent terrestrial ecosystems. While wildlife enhancement and recovery are worthy goals, they are not established as a responsibility of the farmer. Such an amendment would be broad and unenforceable, and is without precedent in the Final Rule.

Definitions

In response to public comments, the AWG proposes adding the following to "Terms defined:"

> Natural assimilative capacity. The ability of an aquatic ecosystem within and surrounding an aquaculture facility to assimilate and process effluents discharged from the facility without reduction in that ecosystem's ability to function and maintain life.
>
> Sustainability. Meeting the needs of the present without compromising the ability of future generations to meet their own needs (1987 Brundtland Report). Sustainably managed resources are those where long-term productivity is maintained to meet human needs while simultaneously conserving biodiversity, environmental quality, and ecosystem services. Ecosystem services are functions provided by ecosystems such as nutrient cycling, flood control, and more. Their importance was highlighted in the 2005 Millennium Ecosystem Assessment report, which was the result of a major international effort involving a number of agencies.

Minimum nutritional requirements. Those that support optimum growth, health and reproduction in all life stages of aquatic animals cultured in all types of rearing systems.

The AWG has considered adding definitions for the following as suggested in some comments, and finds that they are unnecessary: "as natural as possible," "biodiversity," "quality of adjoining," and "commercially available." These words and phrases are self-explanatory or in common use with established definitions and therefore unnecessary.

Genetically modified. A number of comments were received concerning the term "genetically modified" and the need to include other excluded methods. The AWG proposes to change terms such as "genetically modified" in the proposed standards to "all excluded methods under § 205.2 Terms defined." wherever such terms appear. The definition below is from the existing Final Rule.

Excluded methods. A variety of methods used to genetically modify organisms or influence their growth and development by means that are not possible under natural conditions or processes and are not considered compatible with organic production. Such methods include cell fusion, microencapsulation and macroencapsulation, and recombinant DNA technology (including gene deletion, gene doubling, introducing a foreign gene, and changing the positions of genes when achieved by recombinant DNA technology). Such methods do not include the use of traditional breeding, conjugation, fermentation, hybridization, in vitro fertilization, or tissue culture.

§ 205.250 Aquaculture general.

Closed systems. Comments were received that only closed aquaculture facilities be considered for producing fish and plants to be labeled organic, and that open water net pens should not be allowed. The reasons provided are to prevent escapes that can disrupt wildlife, spread disease, and contaminate the surrounding environment. There are no specifications provided for a closed system other than limiting inputs and outputs.

AWG has carefully considered various aspects of locating, building and operating open water net pens. As a result, there are many provisions in the proposed regulations directed towards preventing escapes, controlling diseases, and preventing environmental contamination. Also see responses to comments in § 205.255 Aquaculture facilities discussed later in this document.

§ 205.251 Origin of aquaculture animals.

Sex reversed broodstock. Some commenters seek to disallow sex-reversed broodstock for the development of monosex stocks. § 205.236 (a) (3) provides that "Livestock used as breeder stock may be brought from a non-organic operation onto an organic operation at any time: provided, that if such are gestating and the offspring are to be raised as organic livestock, the breeder stock must be brought onto the facility no later than the last third of gestation."

The proviso in this section is not applicable to aquatic animals. Furthermore, there is a well established precedent in the Final Rule to allow non-organic breeder stock. No other field in organic livestock production has such proscriptions on broodstock as suggested.

Organic broodstock. One comment is that fish stocks should ideally be sourced from organic stocks. While some people may find this to be the ideal, organic aquaculture is a relatively new endeavor and it is impractical to require producers to use organic broodstock.

Triploid. Many comments were received that triploid animals should be allowed in organic aquaculture. AWG has carefully reconsidered the proposed proscription in the Interim Final Report.

Environmental protection, welfare, and integrity is an important principal of organic aquaculture. The use of polyploid aquatic animals can be seen as a way to advance this principal. The main case for polyploidy is the "biological barrier" argument related to the sterility of triploid fish. (It should be noted that the barrier argument does not hold true for all polyploids because tetraploids are not sterile and can breed with diploids to produce triploids.) In the event of an escape, triploid aquatic animals will be reproductively isolated from wild stocks. However, escaped triploids can have effects on native fish populations, such as occupation of spawning sites and consumption of natural foods, that are not affected by ploidy.

One possible exception for including triploid aquatic animals in an organic aquaculture system is the incorporation of triploid grass carp, a non-native and potentially invasive species, for vegetation control in polyculture with organic pond-raised fish. In this case, the grass carp would not be marketed as organic, but would be a component of the organic aquaculture system as a biological pest control organism. There is precedence for this in organic crop production, and § 205.254 (c) provides for such use.

The main case against artificial polyploidy for products to be marketed as organic is the general "mimic nature" principle of organic agriculture. In section 9.4 (p. 49) of the proposed IFOAM Aquaculture Production Standards, the Recommendations include the statement that "aquatic animals should begin life by natural methods". Further, section 9.4.2 explicitly states: "Operators shall not utilize artificially polyploided organisms".

Whether or not polyploid animals are genetically engineered or GMOs is an arguable point. The IFOAM web site has a discussion paper called "The reasons for rejecting genetic engineering by the organic movement". The appendix of this document include's IFOAM's "Position on Genetic Engineering and Genetically Modified Organisms". These are a few salient passages from that document:

> 1) IFOAM defines genetic engineering as "a set of techniques...by which the genetic material...[is] altered in ways or with results that could not be obtained by methods of natural mating and reproduction or natural recombination." In the strictest interpretation of this definition, induced polyploidy can be interpreted as genetic engineering.

2) The paper states that "genetic engineering is a method of breeding in which synthetic gene constructs are forcefully introduced, rather than that in which natural processes are used and where the self-regulation of organisms is stimulated. In organic agriculture, genetic engineering is seen as a technology which forces the organisms to do what humans want, instead of eliciting a reaction in which the natural entity retains its relative independence as a partner." This "intrinsic value and organismal integrity" issue is an important and subtle philosophical point. By making sterile triploids, the producer is essentially preventing that organism from potentially breeding in the future (terminal production aside).

Some argue that triploidy occurs naturally in populations and so should be allowed. This is true, but is a matter of degree. The frequency of "natural" polyploidy is extremely low in most natural fish populations. The current USDA standards defines "excluded methods" as "a variety of methods used to genetically modify organisms or influence their growth and development by means that are not possible under natural conditions... . Using shock treatments to artificially increase the frequency of polyploidy is not natural. Based on a core principal of organic agriculture of trying to "mimic nature", it is difficult to argue that induced polyploidy is natural. Fertilized eggs are not exposed to the physical extremes (e.g., temperature and pressure shocks) in nature that are usually used to induce polyploidy in aquaculture.

Part of the basis for the prohibition of polyploidy in the draft standards is that organic aquaculture standards used by various international standards organizations, with very few exceptions, prohibit triploidy. As USDA standards become harmonized with existing international standards, the inclusion or proscription of triploidy is an obvious issue.

For the reasons discussed above, the AWG proposes retaining the proposed proscription of polyploidy for aquaculture products produced for sale as organic.

5% of total weight. The Interim Final Report includes:

> (a) Aquatic animals grown in aquaculture to be sold as organic must have been under continuous organic management beginning no later than the second day after final larval metamorphosis and the beginning of exogenous feeding, where applicable by species, or beginning no later than when 5% of total market weight has been achieved, whichever is greater. However, in either case, substances prohibited in § 205.602 and § 205.604 are not allowed during earlier life stages;

Comments received project that 5% of total market weight is arbitrary and will invite abuse through loopholes, including use of prohibited methods, and that organic management should begin no later than two days after the beginning of exogenous feeding. One stated that "organic aquatic animals must be treated as organic from larvae. If not, that species is not ready for organic aquaculture production."

While the AWG agrees that the 5% size threshold is arbitrary, it is qualitatively less arbitrary than the two-day threshold because of the broad diversity of cultured species and associated variation in developmental biology. Many fish larvae have gastrointestinal tracts that are in the process of developing at the time of first exogenous

feeding. It is thought that they obtain essential nutrients not from digesting live prey, but as a consequence of live prey self-digesting in their GI tract. Such species could not survive on prepared feed alone until they reach the fry stage and/or undergo metamorphosis to become fry (an example is halibut). Trout, salmon and catfish, to name a few, have large eggs that hatch large fry with large yolk-sacs. After assimilating the yolk-sac, the fish begin to feed and can be fed prepared feed, but with restrictions on ingredients (no soybean meal, for example).

Some international aquaculture standards allow organic management to begin after 10% or even 30% of total market weight. The Final Rule allows that poultry "must be under continuous organic management beginning not later than the second day of life." This is approximately 5% of market weight for a chicken. The AWG proposal follows this poultry precedent in requiring organic management to begin no later than 5% of final market weight. It also follows the general approach of exempting the earliest life stages from requirements for organic management in the current USDA standard for terrestrial livestock and requiring the overwhelming majority (95%) of growth to occur under organic management.

There are a wide range of hatchery methods employed in aquaculture. It was the opinion of AWG that covering all such practices would result in a considerable number of additional regulations thereby greatly expanding the proposed additions to the Final Rule as well as added complexities. Provisions in the Final Rule for poultry provide an appropriate precedent.

One comment pertains to the use of therapeutics before the 5% weight threshold for organic management. The use of therapeutics is controlled in § 205.251 cited above that states "However, in either case, substances prohibited in § 205.602 and § 205.604 are not allowed during earlier life stages;" The AWG proposes that the National List will prohibit the use of certain therapeutics that are not consistent with organic production.

§ 205.252 Aquaculture feed.

The most numerous public comments received from both the original public comment period and from the period around the October 2006 meeting of the NOSB pertained to aquaculture feed. These comments concern the utilization of wild harvested fish for the production of fish meal and oil for feeding farmed fish. Matters of concern include the appropriateness of carnivorous fish in aquaculture, sustainability of wild fishery resources to produce fish meal and oil, and persistent organic contaminants in aquaculture products. The use of terrestrial animal byproducts was also frequently commented upon. These concerns will be addressed in this section.

Natural foods. Several comments were received concerning the proposed language:

> (b) To the greatest practical extent, cultured aquatic animals should be provided their natural foods as closely as possible.

Comments were received pointing out that natural diets, however defined, may not be as healthy as formulated feeds. For many aquatic animal species, natural diets are

not well known and can vary considerably since wild piscivores are often opportunistic feeders of other wild animals without a set diet.

While it is well establish in organic philosophies that animals should be fed diets that replicate their natural diets as closely as possible, AWG recognizes that superior health of farmed animals can often be achieved by diets that are formulated to best meet minimum nutritional requirements and that promote aquatic animal and ultimately benefit human health. While superior health of animals is essential in organic management, feed ingredients natural to the animal should be maximized to the extent possible consistent with optimum health.

The importance of this proposal in the Interim Final Report is demonstrated by the example of salmon lipids. In nature salmon accumulate large amounts of omega-3 fatty acids from their natural diets. These lipids are important in human health. However, it is possible to feed lipids that are not common in natural diets such as omega-6 fatty acids and even saturated fats and hydrogenated vegetable oils to salmon to satisfy their energy requirements. While this may be an economical management practice, it prevents consumers from receiving important omega-3 fatty acids that they expect from eating salmon. The requirement to provided aquatic animals their natural foods as closely as possible is one way to prevent undesired fatty acid substitutions.

Carnivores. A number of comments were received asserting that carnivorous fish should not be allowed in organic aquaculture claiming that carnivory is inconsistent with organic principles. The one inconsistency cited by commenters is that that g rowing highly carnivorous fish on a diet high in fish meal and oil is an unsustainable practice.

These comments ignore one fundamental difference between terrestrial and aquatic ecosystems, namely the absence of seeds. Seeds (grain) are the major food source for non-ruminant terrestrial herbivores and omnivores. This food source is absent in the natural diets of fish. In aquatic ecosystems, algae are the primary means by which sunlight is captured and converted to available energy. Algae are consumed by zooplankton, which in turn are consumed by small fish and various invertebrates. There are some finfish species for which algae are the primary food source, but most species of finfish, including those classified as omnivores, depend upon animal protein in the form of zooplankton, invertebrates and other fish as food sources, and are thus carnivorous to some degree. Carnivorous fish species are more accurately termed piscivores, meaning that they rely on fish and invertebrates as primary food sources.

It is not possible to grow most marine and many freshwater fish on plant-based diets alone. Some essential amino acids are only available in sufficient amounts to meet nutritional requirements of piscivores from marine or terrestrial animal proteins. However, it is possible to grow piscivores using feeds in which plant proteins supply the majority of protein.

A comment received states: “We do not support open-net cage carnivorous species for organic standards. We would support herbivores in these standards.”

AWG responds that there are no proscriptions against growing carnivorous or piscivorous animals in the Organic Food Production Act, nor in established organic philosophy and principles. Fish meal is fed to hogs and poultry in organic production as

feed supplements without limitation on amounts or sourcing criteria. Free-range poultry consume animal protein in the form of insect larvae, yet similar objections to the production of free-range poultry on the basis of carnivory have not been made. While some organic consumers have vegetarian diets, this is a matter of choice and not an established organic principle or requirement.

The farming of omnivorous livestock that receive some animal protein is a well establish organic practice with detailed standards in the Final Rule for livestock.

Objection to carnivory appears to be rooted in concern over presumed trophic inefficiencies associated with the aquaculture of carnivorous fish. Critics of carnivorous fish aquaculture assume that this form of aquaculture results in a net loss of protein because a greater biomass of fish used to make fish meal is required than will result from the aquaculture of carnivorous fish.

Finally, implicit in the argument about a net loss of fish protein, some critics of carnivorous aquaculture assume that fish that are currently used to make fish meal would be better consumed directly as human food. However, the market for direct consumption of these resources is very small relative to supply and aquaculture thus functions as a way to convert relatively low-value protein into high-value protein. Some seek to leave fish in the ocean for conservation purposes (*e.g.*, to support marine food webs) or because they believe fishery management is inadequate. Current feed formulations for piscivores contain 25-50% fish meal and up to 34% fish oil. The AWG proposed to limit fish meal and oil from marine resources to 12% each over the next seven years after which none will be allowed unless from organic production.

Objections to growing piscivorous fish in aquaculture are carefully considered in this proposal and are without precedence in established organic practices.

Fish meal and oil. A wide range of comments pertain to the use of fish meal and oil in feeds for aquatic animals.

Some commenters suggest that trimmings should be the preferred source of fish meal and oil. AWG has provided for the use of trimmings in:

> (i) Fish meal and fish oil from wild fish and other wild aquatic animals may be used as additives and supplements for organic aquaculture or livestock feeds as provided in this section for seven years after the date when organic standards for farmed aquatic animals are promulgated, and must be derived from wild sources that are in compliance with (c) and (d) may be used as supplements and additives under one of the following:
>
> > (2) Carcasses, viscera, and trimmings from the processing of wild fish and other wild aquatic animals that are destined for human consumption. The portions of processed wild fish destined for human consumption may not be certified or labeled as organic unless provided elsewhere in this rule.

Other comments concern the proscription of sourcing fish meal and oil from a different genus. This proscription is a preferred animal health practice provided in:

> (j) Aquaculture feeds may include fish meal and oil derived from organically raised aquatic animals or algae without limitation according to an Organic System

Plan, providing the meal and oil is produced from aquatic animals of a different genus than the aquatic animal being fed.

Also received were a range of comments including: “wild fish must not be used in organic feeds” vs. “fish meal and oil must be allowed as provided in Option A” of the Interim Final Report. Another set of comments are “limit fish meal and oil to 5%.” vs. “do not limit fish meal and oil.”

One comment states “sourcing fish meal and fish oil from wild fisheries is inappropriate for organic aquaculture” because it is not consistent with the organic principle of “control over all level of production.”

As discussed in the Interim Final Report, the Act as amended allows for fish harvested from wild resources to be labeled organic. In addition, the Final Rule provides for organic labeling of wild crops.

§ 205.207 Wild-crop harvesting practice standard

(a) A wild crop that is intended to be sold, labeled, or represented as organic must be harvested from a designated area that has had no prohibited substance, as set forth in § 205.105, applied to it for a period of 3 years immediately preceding the harvest of the wild crop.

(b) A wild crop must be harvested in a manner that ensures that such harvesting or gathering will not be destructive to the environment and will sustain the growth and production of the wild crop.

Under this section, wild macro-algae (kelp) is harvested and labeled organic as are other wild crops.

Most if not all foreign organic aquaculture standards allow the use of fish meal and oil from wild harvests, with the qualification in some cases that these resources be derived from fisheries that are sustainably managed. Some limit such meal and oil to trimmings of fish harvested for human consumption.

It is also asserted that fish meal does not conform to the requirement that livestock feed ingredients be raised organically because there are no organic fish. Under § 205.237 Livestock feed, nonsynthetic substances must not be used as feed additives and supplements in amounts above those needed for adequate nutrition and health maintenance for the species at specific stages of life. Under § 205.2 Terms defined Feed Supplement is defined to improve the nutrient balance or performance of the total rations that can be mixed with other ingredients. Fish meal at a level of 12% of the feed is a feed supplement.

The use of fish meal is well established as a supplement in feeds for organic livestock as are uses of feed supplements that are not raised organically. The Final Rule allows fish meal and oil that are not certified as organic as a supplement for feeding hogs and poultry without restriction as AWG proposes for fish meal and oil in aquaculture. The Act favorably addresses wild fish. The use of wild fish products as feed additives and supplements for livestock is a well established practice.

To proscribe any feeding of fish meal and oil to piscivores would be without scientific foundation, would be inconsistent with Livestock standards, without precedent in established organic practices, and contrary to the organic principle of providing all essential nutrients to organically-raised animals via their feed. To deny organically-farmed fish certain nutrients essential for growth and health violates organic principles, and for most species of fish, the full complement of essential amino acids and fatty acids cannot be supplied from plant-derived feed ingredients alone.

Low trophic level species. Some commenters opposed to carnivorous fish and the use of fish meal and oil in aquaculture urge that organic certification be restricted to low trophic level species (shellfish and herbivorous fishes). Page 30 is a *Reference Sheet for Fish Meal and Fish Oil in Feeds of Farmed Fish and Shrimp* for aquatic species likely to be of interest for organic production. This table shows considerable variation in the percentage amounts of fish meal and oil required amongst the numerous species. However, in all cases, including shrimp, fish meal and oil is required for healthy production.

In the United States, candidate species for organic certification that are the most consumed include shrimp, salmon, catfish, tilapia, trout and striped bass. Only a few of these are low trophic level species are in production. To only allow organic certification of low trophic level species would greatly limit organic aquaculture under USDA standards. However, organic certification would be allowable under other less rigorous foreign standards..

There are no precedents in organic principles or practices to restrict organic aquaculture to low trophic level species.

Sustainability. Some comments assert that capturing wild fish for fish meal and oil increases stress on natural populations and must be prohibited in order to not cause broader ecosystem effects and environmental harm. The AWG concurs that sustainability must be a major concern in the sourcing of fish meal and oil for feeding aquatic animals and livestock and that it is essential that the sustainable harvest of wild fish used in the formulation of aquaculture and livestock feeds be considered carefully.

One comment seeks that sustainability be verified by an independent, third-party group not affiliated with producers, and that sustainability criteria include a measure of overall ecosystem impact with a sustainability report that includes “an analysis of the inherent vulnerability of the species, status of the stocks, nature and extent of by-catch in the fishery, impacts on habitats and ecosystems and management.”

The Interim Final Report proposed that sustainability of fishery resources be established by national or international organizations that use recognized and defensible criteria, and that these organizations do not have any administrative or regulatory oversight of the fishery being evaluated. Comments were received that under current NOP policies, third-party accreditors, such as Marine Stewardship Council, cannot or should not be recognized, and that MSC is not an appropriate organization to determine sustainability as proposed in the Interim Final Rule.

Upon careful review of public comments received, the AWG proposes that the regulation not reference the Marine Stewardship Council or any other similar private

organization. AWG proposes the following substitute in § 205.252 Aquaculture feed to assure sustainable harvests:

> (d) Fish meal or fish oil may not be sourced from any fishery classified by relevant state/provincial, national, or international fisheries authorities as follows: "at risk of reduced reproductive capacity;" "suffering reduced reproductive capacity;" "harvested outside precautionary limits;" "over-exploited;" "depleted;" "overfished;" "overfishing is occurring;" or any other comparable classification, or at significant risk of those conditions within the next recruitment cycle,.

This proposal relies upon a wide range of government or public authorities to determine the status of fishery resources. The burden will be upon the applicant farmer to demonstrate a lack of such classifications for the fisheries from which fish meal and oil are obtained. This revised proposal requires that fish meal be produced from sustainably managed fisheries.

One commenter seeks to add "All feed and feeding practices must be consistent with organic principles including the use of organic feed that is derived from environmentally sustainable sources." Other public commenters seek to proscribe the use of fish meal and oil from wild harvested fish due to sustainability concerns. The Livestock committee of NOSB requested further public comment on this matter and additional public comments were received.

In view of comments received, the AWG proposes the following definition of sustainability be included under Terms Defined:

> Sustainability. Meeting the needs of the present without compromising the ability of future generations to meet their own needs (1987 Brundtland Report). Sustainably managed resources are those where long-term productivity is maintained to meet human needs while simultaneously conserving biodiversity, environmental quality, and ecosystem services. Ecosystem services are functions provided by ecosystems such as nutrient cycling, flood control, and more. Their importance was highlighted in the 2005 Millennium Ecosystem Assessment report, which was the result of a major international effort involving a number of agencies.

The prohibition in (d) against use of fish meal and oil sourced from stressed fishery resources as determined by various government authorities is a practicable way to implement this definition of sustainability

Furthermore, as discussed previously, the AWG proposal allows the recovery of valuable marine protein from otherwise wasted trimmings as follows:

> (i) Fish meal and fish oil from wild fish and other wild aquatic animals may be used as additives and supplements for organic aquaculture or livestock feeds as provided in this section for seven years after the date when organic standards for farmed aquatic animals are promulgated, and must be derived from wild sources that are in compliance with (c) and (d) may be used as supplements and additives under one of the following:
>
> > (2) Carcasses, viscera, and trimmings from the processing of wild fish and other wild aquatic animals that are destined for human consumption. The portions of processed wild fish destined for human consumption may not be certified or labeled as organic unless provided elsewhere in this rule.

The use of trimmings as proposed allows the recovery of valuable protein and lipids that otherwise would be wasted consistent with waste recycling tenets of organic production philosophy. A comment states:

> The use of "carcasses, viscera, and trimmings from the processing of wild fish and other wild seafood that are destined for human consumption" should be permitted in feed, pursuant to §205.252(g)(2) of the AWG Interim Final Report.

Some comments received claim that aquaculture that uses fish meal and oil from wild harvests is not sustainable. The AWG proposal includes a commonly accepted definition of sustainability that includes "Meeting the needs of the present without compromising the ability of future generations to meet their own needs." This proposal, particularly with parts (c) and (d), helps to assure that organic aquaculture is sustainable.

The proposal of the AWG provides that fish meal and oil for organic aquaculture is in full compliance with conventional fisheries management criteria for sustainability.

Terrestrial animal by-products. A number of commenters seek the use of terrestrial animal by-products for aquatic animal feeds. One reason to use terrestrial animal by-products in aquaculture animal feeds is to develop markets for by-products from organic poultry production. Terrestrial animal by-products can be included in feeds to provide essential amino acids that must otherwise be obtained from fish meal or from synthetic amino acids. One commenter asserts that there is a lack of compelling scientific rationale to prohibit this practice.

The Livestock Committee of NOSB requested further public comment on this matter. While there was some support to include organic by-products in aquatic animal feeds, the prevailing comments were to support the AWG-proposed proscription.

In the Interim Final Report, AWG follows the proscription in the Final Rule for the use of such by-products in organic feeds in Livestock. In addition, AWG understands that a large segment of organic consumers are vegetarians who would shun farmed fish that are fed terrestrial animal by-products. AWG continues to propose proscription of the inclusion of terrestrial animal by-products in organic fish feed.

Synthetic amino acids. Comments were received opposing the use of synthetic amino acids in aquaculture feeds. As now proposed by AWG, sufficient amounts of essential amino acids should be available from the allowed fish meal. However, without the 12% allowance of fish meal as proposed, and with terrestrial animal by-products proscribed, synthetic amino acids will be essential for the good health of some aquatic animals. The use of synthetic amino acids in aquatic animal feeds would require their inclusion on the National List of approved substances, as is the case now with synthetic amino acids in poultry diets.

Contaminants. Many comments were received relating to contaminants in farmed fish both in original public comments and with public comments received for the October 2006 NOSB meeting. Concerns have been expressed about the utilization of wild fish and fish oil in feed due to the perception that relatively high levels of contaminants in fish cultured with feeds containing these ingredients. Comments were

received seeking the establishment of maximum contaminant levels and to require end-product testing for contaminants.

To varying degrees, unavoidable residual contaminants accumulate in all products of organic production. Although organic principles and the Act make no reference to specific contaminant levels and make no claims about product quality and safety for consumers, the AWG acknowledges that this is an area of special concern with fish consumption and that consumers have reasonable expectations about low contaminant levels in organic products.

The AWG is aware that contaminants occur in both wild and farmed seafood through bioaccumulative and other processes. This is also the case for a wide range of terrestrial animal products, including poultry and dairy, where levels of contaminants may sometimes be comparable or greater than that of farmed fish.

As a result of the comments received and other information, AWG proposes including the following regulation:

> (m) For fish meal and fish oil from wild fish used in organic feeds, levels of unavoidable residual environmental contaminants, including persistent bioaccumulative toxins (PBTs) and mercury, cadmium, lead, arsenic and tin must be less than or equal to the lowest levels found in commercially available fish meal and fish oil, provided, however, that the comparable products are classes of fish meal and fish oil allowed in this section, and do not include those produced with volatile organic solvents not allowed under § 205.603. Fish oil must be treated with activated carbon, which may include synthetic activated carbon, or any process using water as a solvent, for removal of contaminants

This proposed regulation by AWG requires that:

1. Fish meal and oil must be from wild fisheries where contaminants are less than or equal to the lowest levels found in commercially available fish meal and fish oil, and
2. Fish oil must be treated with activated carbon, which may include synthetic activated carbon, or any process using water as a solvent, for removal of contaminants.

In addition, the proposed standard includes:

> (b) Fish meal from wild fish used as a feed ingredient may not exceed 12% by weight of feed, and fish oil from wild fish used as a feed ingredient may not exceed 12% by weight of feed as averages over the production cycle of the fish.

Fish oil is the major source of contaminants in aquaculture feeds. In conventional aquaculture of some aquatic animals levels of fish oil in feed reach 30% or greater. The proposed maximum allowance of 12% reduces the amount of oil fed to the fish to 30% of conventional practice. The requirement to source fish oil from resources that are low in contaminants may decrease levels to 50% of those in conventional sources. In addition, treatment of oil to reduce contaminants is expected to further reduce levels of these substances by another 50%.

As a result of (1) the reduction of oil in feed to 12%, (2) sourcing from fisheries with the lowest levels of contaminants, and (3) treating oil to remove contaminants, the

AWG proposal will result in farmed fish with substantially reduced levels of contaminants relative to wild or conventionally produced fish, as well as many other food items, both organic and conventional.

The compounding of these three requirements provides a substantial decrease in contaminants. Approximate calculations show: 12%/30% x 0.5 x 0.5 = 0.1. This means that residual contamination would be 10% of the levels found in conventional farmed salmon. Under this proposed standards, contaminant levels in farmed organic salmon would be among the lowest of available protein foods for consumers.

A recent paper in the Journal of the American Medical Association[7] compares amounts of PCBs and other contaminants in farmed salmon with other food items common in American diets. This paper reports PCBs in farmed salmon are lower than in butter, and comparable to chicken. Another recent paper by the Institute of Medicine discusses this subject,[8] and an assessment of risks and benefits associated with fish consumption, is the June 2004 report from the Foods Standards Agency of the UK[9] that provides "coherent dietary advice for the public on the consumption of fish."

The AWG expects that contaminants contained in salmon farmed under proposed regulations (b) and (m) above will be substantially lower than in conventionally grown farmed salmon. AWG also expects that levels of contaminants in farmed fish grown under this proposal will be substantially lower than in other conventional food items that are consumed in greater amounts, including butter, chicken, beef, and other foods.

Product testing. A commenter asserted that "enforceable maximum contaminant levels need to be established and should be based on a significant magnitude of order below Environmental Protection Agency guidance levels." There is no precedent for such a standard with other organic food items that may also contain PCBs and other contaminants.

Another comment is "end product testing should be required in order to ensure that there has been minimal bioaccumulation of contaminants from feed. Producers can use this kind of testing to add value to products while consumers will be better assured and willing to pay a premium for fish with little to no contamination." AWG responds that such product testing is not required of other organic food items that contain PCBs and other contaminants.

AWG responds that the possibility of establishing maximum food contaminant levels and testing requirements is an issue to be addressed for all organic food items, not just the products of organic aquaculture. Furthermore, the AWG believes that there is no justification to hold aquaculture to a higher standard than other forms of organic production with respect to product testing.

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[7] Mozaffarian, Dariush, and Rimm, E. Fish Intake, Contaminants, and Human Health: Evaluating the Risks and the Benefits, *Journal of the American Medical Association*, October 18, 2006, Vol. 296, No. 15; 1885-1899.

[8] Institute of Medicine. 2006. *Seafood Choices: Balancing Benefits and Risks*. National Academies Press, Washington, DC. at www.nap.edu.

[9] www.food.gov.uk/news/newsarchive/2004/jun/fishreport2004

It is well established that organic standards are not food safety standards but instead are process standards. Requiring routine testing would be inconsistent with organic practices.

Another commenter asserts that § 205.671 is applicable to fish and that the organic standards should amend § 205.671 by adding a provision as follows:

> "When residue testing in fish detects unavoidable residual contaminants at levels that are greater than Environmental Protection Agency recommended monthly fish consumption limits established for consumption of one fish meal per month, the fish product must not be sold, labeled or represented as organically produced."

Another commenter states: "Because the EPA has not established tolerance levels for contaminants in aquatic species, the provisions of § 205.671 of the NOP, *Exclusion from organic sale*, are not applicable to this situation."

This commenter suggests that a determination be made of acceptable levels such as "States are now monitoring contaminants in fish and issuing warnings about consuming those species found to have excessive levels. It might be reasonable to base organic tolerance levels on these figures."

AWG responds that these comments address much broader food contamination issues that should apply to all organically produced foods and not directed to farmed fish alone. It is also important that organic claims are process claims, not product quality claims. Should this underlying principle need revision, such changes must apply broadly to all organic food production and not apply to aquaculture products specifically.

5-year sunset. Some commenters in the April round of public comments suggested the use of fish meal and oil as feed ingredients from wild sources be allowed for an initial five-year "sunset" period. As a result, the Livestock Committee sought further public comment.

After careful consideration, AWG proposed a seven year period:

> (e) Fish meal and fish oil from wild fish and other wild aquatic animals may be used as ingredients for organic aquaculture or livestock feeds as provided in this section for a period of seven years after the date when organic standards for farmed aquatic animals are promulgated as an amendment to the Final Rule. However, fish meal and oil produced from wild fish and other wild aquatic animals that does not qualify as provided in this section cannot be used in organic production of aquatic animals.

The seven-year period is based upon the expectation of the AWG that alternative sources to fish meal and oil from wild sources will develop for commercial application. This may include fish meal from organically grown fish and oil from organic microbial processes.

During the October round of public comments, one comment received is "It is our understanding that no other organic product has been allowed this transition or grace period, …" A necessary feature of the U.S. Final Rule is the allowance of transition

periods as exemplified in the National List. An example is the use of synthetic methionine in poultry feed for a limited time period.

An important comment received states:

> "Our concern lies in the problems that may occur at the retailer or distributor level if the farm loses its organic certification. Following the seven year period, stores and distributors who are carrying product that lost its certification will be forced to seek out new suppliers who have adapted to meet the new standards. This is a burden on smaller retailers or distributors who may not have the ability to research new suppliers a second time or may lead to the incorrect continued use of the organic label on products which have had their certification lapse. Furthermore, during the 7-year interim period, those products that are certified organic will not necessarily meet the criteria for 'sustainable' that a number of conservation groups currently use. During this period, consumers could be confused as to what the organic label includes.
>
> "We recommend using a transitional label, similar to how produce is labeled as the farms move out of conventional production to organic production. During this period, consumers can choose the transitional label, knowing that it does not meet the sustainability criteria of full organic certification, but that they are still supporting an aquaculture operation that has made a commitment to improving its practices."

Another comment from a major aquaculture feed producer expressed doubt as to whether the aquaculture research community will be able to develop alternative within the 7-year time-frame.

The expectation of the majority of AWG is that, before the end of the seven-year introductory period, alternative sources of organic fish meal and oil will develop to allow complete substitution of fish meal and oil from wild harvested fish resources, resulting in no disruption in the supply of certified fish.

12% limit on fish meal and 12% limit on fish oil. After reviewing the April comments received, the AWG proposed a 12% limit on fish meal and 12% limit on oil from fish from wild fisheries. During the October round of public comments several objections to this provision were received, including from those who sought no limitation.

One commenter believes the 12% restriction on fish meal will result in excessive use of soybean meal that may result in "tissue damage" and thereby affect animal welfare. A major aquaculture feed producer believes that this limitation will make it very difficult to produce a feed to meet the dietary requirements of carnivorous species. Another stated that the 12% limit is excessively restrictive, without foundation, and arbitrary.

One contrary comment claims that consumers will not find the 12% fish oil and fish meal allowances acceptable. Others claiming to speak for consumers make similar claims without supporting consumer survey data or reports, or justification of their claim

to speak on behalf of consumers. One comment was that fish that consume fish meal and oil are not safe to consume. There is no supportive documentation here either.

Disclosing pigmenting compounds. A comment was received that the use of pigmenting compounds must be disclosed on labels of all end-products. AWG finds that such extra labeling is unprecedented in organic production and handling.

Natural preservatives. Another commenter states that fish meal should be naturally preserved. Unless a petitioner for synthetic preservatives is successful in placing such substances on the National List in the future, all fish meal and oil can only be preserved with natural substances.

Microencapsulation. One commenter suggests inclusion of new: "(k) microencapsulation and macroencapsulation of feed components is not prohibited." AWG responds that microencapsulation and macroencapsulation would be allowed since there is no proposed proscription.

§ 205.253 Aquaculture health care.

Allowing medications. Commenters propose that conventional veterinary medicines, including antibiotics, should be allowed with extended withholding periods, and that anti-parasitic treatments should be allowed. One comment is:

> "While this section is fully consistent with the existing NOP livestock standards, concerns about international harmonization of aquaculture standards, as well as humane practices, suggest that the prohibition on any use of therapeutic levels of antibiotics for aquaculture production should be reconsidered. It should be noted that the OFPA prohibits only subtherapeutic administration of antibiotics, so this would be consistent with the law."
>
> "We note that organic aquaculture standards now in use in Europe and Canada permit the use of conventional veterinary medicines when all else fails, under strictly controlled circumstances. For example, Section 6.9.6.2. of the CAAQ (Conseil des Appellations Agroalimentaires du Quebec) Organic Aquaculture Standards allows only vertebrate aquatic animals to receive no more than two veterinary treatments a year, and withdrawal times must be doubled or two weeks, whichever is longer."
>
> The Interim Final Report provides:
>
> (b) When preventive practices and veterinary biologics are inadequate to prevent disease, a producer may administer synthetic medications, provided that such medications are allowed under § 205.603. Parasiticides allowed under § 205.603 may be used on:
>
> (1) Brood stock, but none that are to be sold, labeled, or represented as organically produced.
>
> (c) The producer of organic aquaculture products must not:
>
> (1) Sell, label, or represent as organic any aquatic animal or edible product derived from any aquatic animal treated with antibiotics, any substance that contains a

synthetic substance not allowed under § 205.603, or any substance that contains a nonsynthetic substance prohibited in § 205.604.

(2) Administer any type of animal medication, other than USDA approved or licensed vaccines, in the absence of illness;

(3) Administer hormones for growth promotion;

(4) Administer synthetic parasiticides;

It is an established consumer expectation that organic foods not contain antibiotics, hormones, and synthetic substances. The AWG proposal follows the precedent under Livestock in the Final Rule. Under this provision, aquaculture producers can petition for the use of certain therapeutic compounds to be allowed in certain circumstances under § 205.603.

Cleaner fish. One comment was received proposing allowing the use of cleaner fish to remove parasites and epiphytes in fish stocks, including sea lice. There are no specific proscriptions against the use of cleaner fish in organic aquaculture in the Interim Final Report. In fact, polyculture is specifically encouraged.

§ 205.254 Aquaculture living conditions.

Some commenters questioned how confinement of fish in net pens is consistent with the organic principle of accommodating natural innate behavior as applied to fish that are migratory. Confinement of fish in any culture system prevents fish from moving freely in the natural environment. This is an obvious and necessary precondition of economically viable aquaculture, both conventional and organic. Similarly, terrestrial livestock are confined in pastures and prevented from migrating to seek better foraging opportunities, an innate behavior that was doubtless characteristic of their genetic forebears.

Most terrestrial livestock that are grown in organic (and conventional) agriculture were derived from wild populations that were domesticated long ago. Most fish species in aquaculture have not been subjected to the same degree of domestication as terrestrial livestock and therefore retain many behaviors and inclinations that are similar to their wild counterparts. Criticisms related to the inappropriate confinement of migratory species in organic aquaculture imply that such fish would not be suitable for organic aquaculture until the propensity for migration was removed by genetic selection. Compared to terrestrial livestock production, aquaculture is relatively new.

There are no organic principles to prohibit aquatic animals from organic production on the basis of the genetic constitution of species that are relatively more wild than domesticated.

§ 205.255 Aquaculture facilities.

Open water net pens. As discussed above, under Proposed § 205.250. Aquaculture general, various comments propose that open water net pens as provided in (k) should not be allowed, and that only closed systems be permitted. In addition to comments below, the AWG response to closed versus open systems is discussed above under § 205.250. Aquaculture general.

Objections to open water net pens concern “disease and parasite transfer, release of chemicals and other drugs, and impacts on predators.” “…pesticides, antimicrobials, and antifoulants … and the extensive predator controls…”

The proposed standards address these issues and their possible impacts. Use of chemicals and drugs are largely proscribed unless approved on the National List. The proposed standards discussed above in § 205.254 Aquaculture living conditions require:

> (b) The culture system must be managed to minimize the risk of losses of cultured stock, stress to cultured aquatic animals caused by predators, and harm to predators. Organic aquaculture facilities must develop an integrated Predator Deterrence Plan as described in the Organic System Plan that identifies potential predators, appropriate deterrence methods, how predator behavior will be modified by application of deterrence methods, documentation of control methods and effects, contingencies for failure to achieve objectives, and how plan implementation conserves biodiversity in the ecosystem adjacent to and including the aquaculture facility.

Some comments project that organic aquaculture must maintain or improve the environment. This is based on foundational principles of organic agriculture that focus on the role of soil and that organic agriculture should endeavor to build soil tilth and fertility. The standards proposed by the AWG meet the objective of these foundational principles.

The role of soil in aquaculture production systems is very different from production systems in terrestrial agriculture. For example, in aquaculture, soil assumes variable importance, with a greater role in pond systems and no role in recirculating systems. The appropriate analogous pairs are soil is to agriculture as water is to aquaculture. In this respect a theme in several comments is summarized by: “there is a significant degradation of the marine environment that can result from farming carnivorous finfish in open net cages.” However, just because some conventional aquaculture production practices in the past may have caused environmental degradation, this does not preclude organic production. It is an objective of these draft standards to eliminate or at least minimize environmental degradation.

The question is how does organic aquaculture maintain or improve water quality. There are two aspects to the answer to this question. First, in some respects, all aquaculture production systems can be viewed as having a negative impact on water quality. In most cases, nutrients and organic matter are added to water of very high quality, leading to varying degrees of eutrophication. However, natural ecosystems have an inherent capacity to assimilate such metabolic nutrients and organic matter without leading to ecosystem degradation. The proposed standards explicitly recognize this assimilative capacity and assure that this capacity is not overloaded.

Second, the idea of maintaining or improving the environment is ultimately a value-based judgment. Some people value pristine water quality. However, a properly managed net pen operation can contribute positively to the local food web and to marine biodiversity. In the complex marine ecosystem, increased fertility can result in water that is more productive from the standpoint of fish production, something that also may be valued by certain segments of society. A healthy local ecosystem is a productive system, and the proposed standards are intended to assure and maintain healthy ecosystems.

Furthermore, net pens can improve the environment by serving as habitat for fish and wildlife, thereby improving the overall productivity of the habitat. With respect to the specific integrated net pen system proposed by the AWG, the system supports an area of locally high biodiversity while simultaneously maintaining high productivity with a number of cultured species, exploiting synergies among the species in the polyculture.

Aquaculture production systems are embedded in a matrix of ecosystems. As such, aquaculture (conventional and organic) can increase habitat diversity. With some pond systems, for example, the surface area of wetlands can be increased. Given the tremendous loss of wetlands in the United States, aquaculture ponds increase the availability of wetland habitat for migrating waterfowl. Aquaculture ponds are also ecotone or edge habitats between much larger terrestrial ecosystems and aquatic ecosystems. Thus, construction of aquaculture ponds can improve overall landscape quality by increasing habitat diversity.

A related objection is that "net-pens require a free flow of water from the cages to the surrounding marine environment, which is not compatible with the current principles of organic production." The AWG knows of no establish organic principle that is contrary to the flow of water into and out of an aquaculture facility with due consideration to the environment into which discharge occurs. By analogy, the terrestrial case would require regulation of the flow of air into and out of an organic agriculture facility and management of associated gaseous wastes.

One commenter seeks to have polyculture a necessity for open water net pens to consume wastes. Paragraph (j) of this section provides

> "Use of multiple species of aquatic plants and animals to recycle nutrients must be included in every Organic System Plan for net-pens."

Another commenter seeks the articulation of specific parameters in various paragraphs in this section. The AWG responds that conditions vary considerably from location to location depending upon local conditions, and that these determinations are best left to the producer and the certifier of the facility.

Conversion periods. Various comments on conversion periods in (m) concern: conversion period should only apply to containment vessels that were previously used for conventional aquaculture; the transition period before organic production should be a certain number of harvests; or that six years should be required.

AWG has carefully considered the wide range of conversion periods for containment vessels that is suggested, and continues to recommend the criteria proposed in the Interim Final Report as being consistent with good organic practices.

Nutrient management plan. One comment is that nutrient management plan as required in (g) makes little sense for an earthen pond. Another is that nutrient recycling must be required in farm system plans.

The AWG recommendation is that nutrient management plans must be considered for all aquaculture production systems.

Distances from conventional production. Another comment is that minimum distances should be specified away from conventional production systems. The Interim Final Report specifies:

> (d) Organic aquaculture facilities shall be at appropriate distances from potential contamination sources including pesticide drift and other possible contaminants from conventional aquaculture.

The AWG suggests that requiring specific distances is inappropriate since conditions vary substantially from facility to facility.

Flood plain. One comment proposed that Aquaculture "Facilities must not be located in a flood plain." This suggestion would preclude a large amount of aquaculture production, including most catfish in the State of Mississippi, and would apply to aquaculture and not applicable terrestrial agriculture. Flood damage mitigation is addressed in the AWG proposal.

Local communities. Another comment proposes that "Water must not be diverted from local communities. All ponds must be maintained in isolation from the surrounding environment and seepage into the surrounding environment prevented." AWG responds that the degree of isolation in this proposal is overly restrictive. Prevention of contamination of the surrounding environment is provided in the Interim Final Report.

US predator control laws unenforceable. It is commented that predator deterrence according to the laws of the US is unenforceable, and lethal measures must be well defined. The AWG position is that certifiers in foreign venues must assure that an organic aquaculture facility is in full compliance with this provision including knowledge and compliance with the laws of the United States where applicable.

Outdoors and natural sunlight. Another comment proposes that access to outdoors and natural sunlight should be required. While this may be appropriate for terrestrial organic livestock, aquatic animals in aquaculture live in water where fresh air and unfiltered sunlight are not applicable considerations.

§ 205.257 Molluscan shellfish.

A number of public comments were received objecting to the absence of proposed organic standards for oysters, clams, scallops, mussels, and other molluscs in the Interim Final Report. The Executive Summary of the Report states:

> "The Aquaculture Working Group is considering the adoption of standards for bivalve molluscan shellfish harvested from the ocean. Unfortunately, due to many complexities involved in this issue, the Working Group has yet to develop such a proposal. AWG intends to continue to explore this possibility and may submit a supplemental proposal."

As indicated, AWG has possible proposed standards for the organic production of bivalve molluscs under active consideration and continues to work towards proposing standards in this complex area.

§ 205.258 Farmed aquatic plants.

A concern was expressed over suggested standards for farmed aquatic plant crops and claims that the Federal Register Notice of January 24, 2005 that established the Task Force states "the general objective of these task force groups is to develop draft organic standards for: (1) The production, handling and labeling of food and animal feed products derived from aquatic animals." The comment is made that aquatic crop standards are beyond the scope of the Task Force.

AWG has included aquatic plants because in some forms of aquaculture they are essential for feeding aquatic animals and are therefore consistent with the stated general objective. Such plant production is an integral necessity for animal production. In addition, the proposal from AWG seeks to encourage integrated aquaculture with § 205.255 Aquaculture facilities (g) requiring a nutrient management plan for every organic aquaculture facility. In many cases the objective of nutrient management can only be achieved by growing aquatic plants.

Another concern expressed is over the allowed use of synthetic fertilizers for macronutrients. The AWG proposed regulations would allow such use of non-organic nutrients only where suitable non-organic plant nutrients are not available and where they are approved on the National List.

§ 205.259 Harvest, transport, post harvest handling, and slaughter of aquatic animals.

Minimum disturbance. A comment seeks further definition in (a).

> (a) Handling of stock during harvesting, transport, and slaughtering operations must be carried out with minimal disturbance and stress to the aquatic animal. Transportation and slaughter must be done as fast and humanely as possible.

AWG responds that conditions vary considerably from site to site, and that further definition of this requirement is best left to the producer and the certifier. However, this paragraph has been modified in the current edition of the Interim Final Report (Revised) to read:

> (a) Handling of stock during harvesting, transport, and slaughtering operations must be carried out with minimal disturbance and stress to the aquatic animal. The time period for transportation and slaughter must be kept to a minimum.

Other important comments received include:

- keeping the period of food deprivation to a minimum.
- deleting decapitation as a method of slaughter since for many species of fish, decapitation is unsuitable as body shapes may prevent its easy application.
- allowing electrocution "with electrical currents sufficient to achieve complete sedation."
- amending §205.259(e) to read "Just prior to slaughter, finfish must be *stunned* by a method that renders them instantly insentient before or

immediately after they are taken from the water, *with unconsciousness lasting until death*."

The AWG concurs with these comments and suggestions and has incorporated them in the revised proposed standards.

In response to a comment received, §205.259(e)(1)(i) is amended to read:

concussion to the head followed by *prompt* severing *of* the gill arches. ~~or decapitation.~~ *with unconsciousness lasting until death.*

Sentience. Several comments seek a description of sentience as it applies to aquaculture and aquatic animals.

Behavioral and neural physiologists identify animals with welfare status as having both cognitive and sentient capabilities. Sentience has been identified as the primary criteria for an animal welfare status. Definitions are:

Cognition: The processes by which animals perceive, process and store information. Animals with cognitive abilities have an internal representation of the world that can be used flexibly and to cope with novel situations.

Sentient animals are those that do not merely demonstrate a physical reflex to the stimulus, but also display an emotional response (i.e., distress, anger, fear). A requirement for an animal to be sentient is possession of Declarative Representation as apposed to simple Procedural Representation. Using fish as an example, leading authorities believe that fish only has Procedural Representation, and the animal has only a simple reaction to a stimulus without having awareness or comprehension about the consequences of its response.

If the animal is judged to have Declarative Representation, this permits selective attention to internal and external stimuli, anticipation, expectation and goal-directed activity, allowing for increasingly flexible behavior and adaptive responses. Awareness of internal and external states is not an all or none phenomenon, but rather a "graded" or limited to a range of subject matter appropriate for the animal's ecology.

Authorities publishing in this field believe that there is sufficient evidence to indicate that fish have Declarative Representation and should be granted a welfare status. Although some scientists believe lobster may qualify, the evidence is not as strong. There is no published evidence to support this position for shrimp or molluscs.

Further information is presented in the following reviews:

Huntingford, F.A., C. Adams, V.A. Braithwaite, S. Kadri, T.G. Pottinger, P. Sandoe, and J.F. Turnbull. 2006. REVIEW PAPER: Current issues in fish welfare. J. Fish Biol. 68: 32-372.

Chandroo, K.P., I.J.H. Duncan and R.D. Moccia. 2004. Can fish suffer?: Perspectives on sentience, pain, fear and stress. Applied Animal Behaviour Science. 86: 225-250.

Chandroo, K.P., S. Yue and R.D. Moccia. 2004. An evaluation of current perspectives on consciousness and pain in fish. Fish and Fisheries. 5: 1-15.

Ice slurry. Comments were received concerning the use of ice slurry. One commenter seeks the use of this conventional practice with the claim that there is insufficient scientific information for proscription:

> "The interim final report contemplates limitations on aquatic animal slaughter methods- particularly the use of ice or ice slurry. It is premature to arbitrarily eliminate effective slaughter methods that appear to ensure product safety and worker safety. There is scant scientific evidence that fish and shellfish are sentient or capable of feeling pain. Indeed, there is active scientific debate regarding these issues and it is by no means an accepted fact."

In contrast, another asserts that:

> "use of an ice slurry, where the fish then asphyxiate "is now considered to cause unacceptable suffering since there may be a prolonged period of stress before death" and that "Further, in warm climates, temperature shock resulting from immersion in ice water slurry can paralyze the fish such that they appear insensible but remain conscious."

This commenter also states that "before allowing slaughter using ice or ice slurry [as proposed in the Interim Final Report for crustaceans, molluscs, and other aquatic animals that are non-sentient], a scientific basis should be established for the alleged non-sentience of specific aquatic animals."

The AWG has carefully considered the emerging body of scientific information supporting the prohibition of ice slurry and the appropriate use of mechanical percussion techniques and electrocution now in practice in Europe and elsewhere. The AWG continues to propose that ice slurry be proscribed in some situations and allowed in others as provided in the Interim Final Report. In the case of warmwater marine fish, technology for mechanical percussion has not advanced to the stage of wide applicability. Therefore, the AWG proposes there be a five year exemption in order to allow technology in this area to develop to commercialization.

Withholding feed prior to slaughter. A comment received sought to amend (c) (6) to read "Although starvation is used to empty the gut ~~contents~~ prior to slaughter, this period should be kept to a minimum."

In the present proposed standard, "food deprivation" is substituted for "fasting" and "starvation." Paragraph (d) addresses this matter in the proposed revision:

> (d) Fish should be held in high quality water for the duration of food deprivation prior to transport and slaughter for a period that allows clearance of stomach and gut.

Abiotic and biotic. One commenter seeks the following amendment:

> (b) Harvest operations must cause minimal disturbance to the abiotic and biotic structure and function of the natural environment.

AWG responds that such an amendment would be confusing and is unnecessary.

Prohibit airfreight. One commenter proposed that airfreight shipping should be proscribed as a fossil fuel conservation measure. The alternative proposed would be ocean shipment of frozen products. Such a proposal is without precedent in organic production and is more appropriately a matter for consideration for all organic products.

Redundancy. One commenter asserts that (h) through (k) "are governed by other health and safety regulations and do not need to be specified here." AWG has proposed these post-harvest and slaughter conditions also be included in this section because of their extreme importance in organic aquaculture production.

Explanations for Specific Proposals

Under **§ 205.2 Terms defined**:

The following definition in § 205.2 shall be amended to read:

Livestock. Any cattle, sheep, goat, swine, poultry, equine animals, or aquatic animals used for food or in the production of food, fiber, feed, or other agricultural-based consumer products; wild or domesticated game; or other nonplant life. Except such term shall not include bees for the production of food, fiber, feed or other agricultural based consumer products.

The Act provides: "The term "livestock" means any cattle, sheep, goats, swine, poultry, equine animals used for food or in the production of food, fish used for food, wild or domesticated game, or other non-plant life." The proposed amendment to the definition of livestock in the Final Rule brings the Rule into compliance with the definition in the Act that aquatic animals are livestock so that the Rule includes “fish used for food” as livestock.

Under **§ 205.251 Origin of aquaculture animals**:

5% of Total Market Weight.

The table below shows the size of various species to which this clause applies. This table is included for information purposes only for the species shown and does not mandate specific weights at which organic management must begin.

Animal	Market weight	Weight at 5%	Comments
Shrimp	20 gms	1 gm	postlarvae
Atlantic salmon	5,000 gms (5 kg)	250 gms	smolt
Catfish	680-800 gms	34-40 gms	large fingerling
Tilapia	500 gms	25 gms	fingerling
Hybrid Stiped Bass	500 gms	25 gms	fingerling
Cod	2,000 gms	100 gms	fingerling
Cobia	4,000 gms	200 gms	fingerling
Redfish	1,000 gms	50 gms	fingerling
Oyster	90 gms [10]	4.5 gms	1/8"-1/4" spat

[10] Weight in-the-shell.

Reference Sheet for Fish Meal and Fish Oil in Feeds of Farmed Fish and Shrimp
(species likely to be of interest for organic production)

Aquaculture Working Group

1-Feb-2007

DOMESTIC FOOD FISH SPECIES, ALL AT GROW-OUT STAGE (POST-JUVENILE)

Common Name	Species	Culture System	Dietary protein (%)	Dietary fish meal (%)	Dietary fish oil (%)
Channel Catfish	*Ictalurus punctatus*	ponds, semi-intensive	28-32	~5	0
Tilapia	*Oreochromis* spp.	ponds	20-30	~1-5	~1
White shrimp	*Litopenaeus vannamei*	ponds	25-35	20-25	~1-4
Rainbow trout	*Oncorhynchus mykiss*	flow-through raceways	40-44	20-25	15
Atlantic salmon	*Salmo salar*	marine net-pens	38-44	30-35	20-22
Arctic char	*Salvelinus alpinus*	tanks, raceways	40-44	25	15
Hybrid striped bass	*Morone saxatilis x M. chrysops*	ponds, tanks	38-44	20-30	10-15
Coho salmon	*Oncorhynchus kisutch*	land-based tanks (WA)	40-44	35	15
Almaco jack	*Seriola rivoliana*	marine net pens	40	27	25
Sturgeon (white)	*Acipenser transmontanus*	land-based tanks	38-42	15-20	12-18
Red swamp crayfish	*Procambarus clarkii*	ponds	0	0	0
SPECIES FARMED IN OTHER COUNTRIES					
CANADA					
Atlantic salmon	*Salmo salar*	marine net-pens	38-44	30-35	20-25
Chinook salmon	*Oncorhynchus tshawytscha*	marine net-pens	40-45	35	15
Arctic char	*Salvelinus alpinus*	tanks, raceways	40-44	25	15
Walleye	*Esox* spp.				
Atlantic cod	*Gadus morhua*	marine net-pens	45	55	10
Haddock	*Melanogrammus aeglefinus*	marine net-pens	45	55	10
Atlantic halibut	*Hippoglossus hippoglossus*				
EUROPE					
Atlantic salmon	*Salmo salar*	marine net-pens	38-44	30-35	20-25
Atlantic cod	*Gadus morhua*	marine net-pens	45	55	10
Turbot	*Scopthalmus maximus*		45-50	50-55	~10-15

European sea bass	*Dicentrarchus labrax*	marine net-pens			
Gilt-head sea bream	*Sparus aurata*	marine net-pens			
Rainbow trout	*Oncorhynchus mykiss*	flow-through raceways	40-44	25-30	20-25
Rainbow trout (Norway)	*Oncorhynchus mykiss*	marine net-pens	40-44	25-30	20-25
CHILE					
Atlantic salmon	*Salmo salar*	marine net-pens	38-44	30-35	20-22
Coho salmon	*Oncorhynchus kisutch*	marine net-pens	40-44	35	15
Rainbow trout	*Oncorhynchus mykiss*	marine net-pens	40-44	25	15
MEXICO and Central America					
Rainbow trout	*Oncorhynchus mykiss*	flow-through raceways	40-44	25	15
Tilapia	*Oreochromis spp.*	ponds	20-30	~1-5	~1
White shrimp	*Litopenaeus vannamei*	ponds	25-35	20-25	~1-4
Blue shrimp	*Litopenaeus stylirostus*	ponds			
Cobia	*Rachycentron canadum*	marine pens			
SOUTHEAST ASIA and JAPAN					
Groupers	*Epinephelus spp.*	marine pens	40-45	45-50	5
Red sea bream	*Pagellus bogaraveo*	marine pens	40-45	45-50	10
Yellowtail	*Seriola quinqueradiata*	marine pens	40-50	40-45	<15
Macrobrachium	*M. rosenbergii*	ponds	~25-30	<10-15	
Tiger shrimp	*Penaeus monodon*	ponds	~30-40	~30-35	~1-4
White shrimp	*Litopenaeus vannamei*	ponds	25	15	
Eel	*Anguilla anguilla*	ponds	40	40-45	~2-5
Barramundi	*Lates calcarifer*	ponds			
Clarias catfish	*Clarias spp.*	ponds		~22-25	0
Pangasius catfish	*Pangasius spp.*	ponds			

Aquatic Animal Task Force

Aquaculture Working Group

Interim Final Report (Revised)

The following is the Interim Final Report of 13 January 2006, revised in response to numerous public comments and further deliberations of the AWG.

§ 205.2 Terms defined.

The following definition in § 205.2 shall be amended to read:

Livestock. Any cattle, sheep, goat, swine, poultry, equine animals, or aquatic animals used for food or in the production of food, fiber, feed, or other agricultural-based consumer products; wild or domesticated game; or other non-plant life. Except such term shall not include bees for the production of food, fiber, feed or other agricultural based consumer products.

The following definitions shall be added to § 205.2 Terms defined.

Aquaculture. The propagation and rearing of aquatic animals and plants.

Aquaculture facility. Any land, structure, or other appurtenance used for aquaculture. Such term includes but is not limited to any laboratory, hatchery, rearing pond, tank, raceway, net pen, cage, raft, longline, geographically defined seafloor, or other structure or defined boundary used in aquaculture.

Aquaculture product. Any product of aquaculture, including but not limited to whole alive or dead aquatic animals, gutted fish, fillets and other forms of raw or processed meat, eggs for human consumption, eggs for reproduction, skin and other animal parts, and alive, fresh and dehydrated aquatic plants, either whole or processed. By-products from aquatic animals grown in aquaculture, such as fish meal, oil, silage, and hydrolyzed offal, are included.

Aquatic animal. Any finfish, mollusc, crustacean, or other aquatic vertebrate or invertebrate grown in fresh, brackish or saltwater, except amphibians, reptiles, birds and mammals.

Aquatic animal broodstock. Sexually mature aquatic animals used to produce progeny that may be incorporated into an organic aquaculture production system.

Aquatic plant. Any plant grown in an aquaculture facility, including microscopic or macroscopic algae, and excluding vascular aquatic plants such as watercress, rice, water hyacinth, and hydroponically produced vascular plant crops.

Aquaculture production system. A process for growing aquatic animals and plants in an aquaculture facility.

Bivalve molluscs. Molluscan shellfish species (Phylum *Mollusca,* Class *Pelecypoda* commonly called bivalves) with two outer, hinged shells such as oysters, clams, mussels and scallops, but not including gastropods and cephalopods.

Coldwater finfish. Salmonids, cod, marine flatfish and other species not considered in this section as warmwater finfish.

Fish meal. Dried ground tissue of undecomposed whole fish or fish cuttings, either or both, with or without the extraction of part of the oil.

Fish oil. Oil from rendering whole fish, fish cuttings, or cannery waste alone or in combination.

Fish silage. A mixture of solids and liquids obtained by the breakdown of fish tissue using natural enzymes with or without addition of acids or bases to control spoilage and to enhance enzyme activity.

Finfish. Aquatic vertebrate animals consisting of bony fish (*Telestomi*), not including mammals, birds, amphibians and reptiles. In this section, coldwater finfish include salmonids, cod, marine flatfish not considered warmwater finfish. Warmwater finfish have optimum temperatures for growth between 25 and 30 C. Examples include catfish, tilapia, and paddlefish.

Metabolic products of aquatic animals. Solid and dissolved compounds released by aquatic animals during growth in an aquaculture production system.

Minimum nutritional requirements. Those that support optimum growth, health and reproduction in fish in all life stages of aquatic animals cultured in all types of rearing systems.

Monosex stocks. Populations of aquatic animals of one sex obtained by artificially induced or natural processes, or by manual selection.

Natural assimilative capacity. The ability of an aquatic ecosystem within and surrounding an aquaculture facility to assimilate and process effluents discharged from the facility without reduction in that ecosystem's ability to function and maintain life.

Persistent bioaccumulative toxins (PBT). Chemicals that resist breakdown and are persistent in the environment, bioaccumulate in food chains through consumption or uptake, and are a hazard to human health or wildlife. A term related to PBT is POP (persistent organic pollutant) and, for the purposes of these standards, the terms are interchangeable.

Polyploid. Aquatic animals with more than two sets of homologous chromosomes. Most aquatic animals are naturally diploid (2n). Triploid aquatic animals are typically sterile (non-reproductive) and tend to grow faster than diploid aquatic animals.

Reportable pathogens. Pathogens of aquatic animals whose diagnosis must be reported, by law, to pertinent state or federal authorities. Included are pathogens listed as Reportable by the Office Internationale Epitozooties.

Shellfish. Aquatic invertebrate animals including molluscs and crustaceans.

Sustainability. Meeting the needs of the present without compromising the ability of future generations to meet their own needs (1987 Brundtland Report). Sustainably managed resources are those where long-term productivity is maintained to meet human needs while simultaneously conserving biodiversity, environmental quality, and ecosystem services. Ecosystem services are functions provided by ecosystems such as nutrient cycling, flood control, and more. Their importance was highlighted in the 2005 Millennium Ecosystem Assessment report, which was the result of a major international effort involving a number of agencies.

Wild fish. Any species of fish or shellfish, raw or processed, harvested from wild sources used for human food or in animal feeds, including feeds for aquatic animals.

§ 205.250 Aquaculture general.

(10) Aquatic animals, aquatic animal products, aquatic plants, and aquatic plant products to be sold, labeled or represented as "100 percent organic," "organic," or "made with organic (specified ingredients or food group(s))," must be produced and handled in accordance with this section: Except that the requirements of Sections § 205.236 through § 205.239 shall not apply to the production of aquatic animals or aquatic animal products and the requirements of Sections § 205.202 through § 205.206 shall not apply to the production of aquatic plant or aquatic plant products.

(11) Metabolic products of aquaculture species are not considered animal manure under § 205.2 Terms Defined, Manure, and § 205.239 (c) Livestock Living Conditions.

(12) Metabolic products of one species are recognized as organic resources for one or more other species in an aquaculture production system. The Organic System Plan of facilities producing aquatic animals must consider measures to recycle or biologically process metabolic products. Where feasible, the Organic System plan must include the polyculture of two or more different species grown in the same body of water, and the integration of additional species as water moves through the aquaculture facility or into adjoining discharge areas.

(13) The feasibility of using water discharges and filtered metabolic products as nutrients for vascular plants in agricultural crops and constructed wetlands must be considered in Organic System Plans. The quantities of such discharges and filtered products applied shall not exceed the requirements of targeted plants in the receiving area, and shall not be discharged into unplanned areas. Vascular agriculture crops using nutrients from certified organic aquaculture operations may be certified organic if in compliance with other regulations in this Subpart.

(14) Organic System Plans for aquaculture facilities must provided for the health and welfare of aquatic animals, preclude prohibited substances, and prevent contamination of aquaculture products from environmental sources.

(15) Biodiversity of natural aquatic ecosystems, functional integrity of aquatic environments, and the quality of adjoining aquatic and terrestrial ecosystems must be protected. All aquatic animals possessed and grown at an aquaculture facility must be in compliance with all applicable laws.

(16) Measures shall be taken to prevent escapes of cultivated animals and plants from the aquaculture facility and to document any that do occur. These measures shall be documented in the Organic System Plan.

(17) By-products from the production of aquatic animals, such as fish meal, fish oil, silage and hydrolyzed offal, produced in an organic aquaculture production system, and handled in accordance with organic handling requirements, may be labeled organic.

(18) Aquaculture facilities shall be designed, operated and managed in a manner that seeks to prevent the spread of disease within the facility and to all adjoining ecosystems and native fish species.

§ 205.251 Origin of aquaculture animals.

(a) Aquatic animals grown in aquaculture to be sold as organic must have been under continuous organic management beginning no later than the second day after final larval metamorphosis and the beginning of exogenous feeding, where applicable by species, or beginning no later than when 5% of total market weight has been achieved, whichever is greater. However, in either case, substances prohibited in § 205.602 and § 205.604 are not allowed during earlier life stages.

(b) Aquatic animals that are removed from an organic production system and subsequently managed on a non-organic facility may not be sold, labeled, or represented as organically produced.

(c) Broodstock that has not been under continuous organic management may not be sold, labeled, or represented as organic slaughter stock.

(d) The producer of an organic aquaculture facility must maintain records sufficient to preserve the identity of all organically managed animals (by lot) and edible and nonedible animal products to assure reliable traceability from farm to market.

(e) Production of triploid aquatic animals by any method including but not limited to the application of temperature or pressure shock after fertilization and by crossing tetraploids with diploids is prohibited for fish to be sold as organic.

(f) Culture of monosex stocks of aquatic animals obtained by direct treatment with steroidal or other hormones (including methyl-testosterone) or by other direct-treatment artificial induction methods, including use of excluded methods, is prohibited.

(g) Cultivation of any genetically modified aquatic animal or an organism produced by any other excluded method provided in § 205.2 Terms defined, is prohibited.

(h) In cases where hatchery progeny of aquatic animals are not commercially available, broodstock may be collected from the wild provided that they are collected in a sustainable manner, as documented in the Organic System Plan, and where appropriate, in compliance with all federal and state regulations, and in collaboration with government agencies, to assure that natural populations and the collected individuals are protected and that biodiversity in the ecosystem is supported.

§ 205.252 Aquaculture feed.

(a) Feeds and feeding practices must meet the minimum nutritional requirements of the aquatic animal. However, fish meal and fish oil produced from wild fish and other wild aquatic animals that do not qualify as provided in this section cannot be used in organic production of aquatic animals.

(b) Fish meal from wild fish used as a feed additive or supplement may not exceed 12% by weight of feed, and fish oil from wild fish used as a feed ingredient may not exceed 12% by weight of feed as averages over the production cycle of the fish.

(c) Wild fish and wild aquatic animals used for producing fish meal and oil for aquaculture may not be certified or labeled as organic for human consumption unless allowed elsewhere in this rule. Whole, chopped, or minced wild fish that does not qualify in this section may not be used as feed.

(d) Fish meal or fish oil may not be sourced from any fishery classified by relevant state/provincial, national, or international fisheries authorities as follows: "at risk of reduced reproductive capacity;" "suffering reduced reproductive capacity;" "harvested outside precautionary limits;" "over-exploited;" "depleted;" "overfished;" "overfishing is occurring;" or any other comparable classification, or at significant risk of those conditions within the next recruitment cycle.

(e) Use of fish meal and fish oil and minimize the environmental impact of released nutrients on receiving waters and adjoining ecosystems as documented in the Organic System Plan.

(f) Aquatic animals must be provided with their natural foods consistent with the need to optimize health and growth of the aquatic animal. This includes live foods and the sources of ingredients in formulated feeds as allowed in the rule.

(g) Feeds for aquaculture products for human consumption may not contain lipids from sources other than fish oil or omega-3 fatty acids produced by organic microorganisms or plants, except that other lipids from organic sources may be provided in feeds for aquatic animals that have a specific dietary requirements for such ingredients to the extent necessary to meet the minimum requirement for that lipid in that aquatic animal.

(h) Aquaculture feeds must be composed of feed ingredients that are certified organic, except that nonsynthetic substances and synthetic substances allowed under § 205.603 may be used as feed additives and supplements.

(i) Fish meal and fish oil from wild fish and other wild aquatic animals may be used as additives and supplements for organic aquaculture or livestock feeds as provided in this section for seven years after the date when organic standards for farmed aquatic animals are promulgated, and must be derived from wild sources that are in compliance with (c) and (d) may be used as supplements and additives under one of the following:

> (1) wild fish, provided that the amount of such wild fish that goes into feeding the aquatic animals cannot exceed one pound of wild fish product fed for every pound live weight of cultured of aquatic animals at harvest; or

(2) carcasses, viscera, and trimmings from the processing of wild fish and other wild aquatic animals that are destined for human consumption. The portions of processed wild fish destined for human consumption may not be certified or labeled as organic unless provided elsewhere in this rule.

(j) Aquaculture feeds may include fish meal and fish oil derived from organically raised aquatic animals or algae without limitation according to an Organic System Plan, providing the meal and oil is produced from aquatic animals of a different genus than the aquatic animal being fed.

(k) Silage and lipids produced from organic fish that is enzyme-processed, or produced with acids and bases that are organically certified or approved in § 205.605 for fish emulsion or other purposes, may be certified organic and incorporated into organic aquaculture feeds without limitation.

(l) Organic aquaculture feeds may include meals and oils containing essential fatty acids produced by processes allowed in organic production.

(m) For fish meal and fish oil from wild fish used in organic feeds, levels of unavoidable residual environmental contaminants, including persistent bioaccumulative toxins (PBTs) and mercury, cadmium, lead, arsenic and tin must be less than or equal to the lowest levels found in commercially available fish meal and fish oil, provided, however, that the comparable products are classes of fish meal and fish oil allowed in this section, and do not include those produced with volatile organic solvents not allowed under § 205.603. Fish oil must be treated with activated carbon, which may include synthetic activated carbon, or any process using water as a solvent, for removal of contaminants.

(n) Nutritional pigment compounds that have been produced and handled in accordance with organic requirements and allowed by the U.S. Food and Drug Administration for inclusion in aquaculture feeds may be used.

(o) Manure from organic terrestrial animals that is composted in compliance with § 205.203 may be used to fertilize aquaculture ponds in an organic production system. Composted manure must not be applied within 30 days of harvest of aquatic products for human consumption. Manure, whether composted or not, shall not be applied to aquaculture production systems other than ponds.

(p) The producer of organic aquatic animals shall not:

(7) incorporate or introduce any type of antibiotic or hormone in feeds, the water supply, or the environment;

(8) provide feed supplements or additives in amounts above those needed for adequate nutrition and health maintenance of the species at its specific stage of life;

(9) feed by-products from mammalian or poultry slaughter;

(10) use feedstuffs extracted with synthetic solvents not approved on the National List;

(11) use feed, feed additives, and feed supplements in violation of the U.S. Federal Food, Drug, and Cosmetic Act; or

(12) use any genetically modified organism, or any organism produced by any other excluded method provided in § 205.2 Terms defined, or product thereof, as a feed ingredient.

§ 205.253 Aquaculture health care.

(a) The aquaculture producer must establish and maintain preventive health care practices that optimize animal welfare and minimize animal stress and pain by implementing the following procedures and practices:

(1) provision of a source of nutrition inclusive of live and formulated feeds sufficient to meet minimum nutritional requirements, including vitamins, minerals, protein and/or amino acids, fatty acids, energy and other necessary dietary or nutritional components;

(2) maintenance of life-supporting water rearing conditions, including control of potentially toxic metabolic compounds (ammonia and carbon dioxide) within known physiological tolerance ranges for the species, and the maintenance of water temperature, oxygen concentration, and pH within known life-supporting values for the species and the prevention of extended excursions to stressful extremes. Efforts to maintain such conditions must be documented by a monitoring and record-keeping program for these and other species specific key water quality parameters that affect health. The frequency of such monitoring shall depend on the culture system, site, species, life stage, and environmental characteristics;

(3) establishment of biosecurity measures known to reduce risk of entry of pathogens into the aquaculture production system. These may include such measures as allowing only entry of broodstock tested and found free of reportable pathogens, animal vector control, and limited human entry by use of fences or barriers and locked entry points. In recirculating systems sanitation procedures must include scheduled removal of accumulated particulate organic matter. Culture water used in the system must be from a source tested and determined free of reportable pathogens and free of known vectors of diseases or disinfected to remove such infectious disease agents. In open water systems, if animals are potentially exposed to known infectious agents, this risk may be mitigated if approved vaccines and vaccination procedures are available. Biosecurity measures should not be used to justify growing conditions that compromise aquatic animal health from elevated stress and associated immunosupression; and

(4) administration of vaccines, other veterinary biologics, and approved natural supplements, such as supplementation or treatment of healthy animals with beneficial bacteria, appropriate to the species and location.

(b) When preventive practices and veterinary biologics are inadequate to prevent disease, a producer may administer synthetic medications, provided that such medications are allowed under § 205.603.

(1) parasiticides allowed under § 205.603 may be used on aquatic broodstock, but none that are to be sold, labeled, or represented as organically produced.

(c) The producer of organic aquaculture products must not:

(1) sell, label, or represent as organic any aquatic animal or edible product derived from any aquatic animal treated with antibiotics, any substance that contains a synthetic substance not allowed under § 205.603, or any substance that contains a nonsynthetic substance prohibited in § 205.604;

(2) administer any type of animal medication or therapeutant, other than vaccination, in the absence of illness;

(3) administer hormones for growth promotion, prevention of reproductive maturation, and sex reversal;

(4) administer synthetic parasiticides except as allowed under § 205.603;

(5) administer animal drugs in violation of the U.S. Food and Drug Administration regulations, and vaccines in violation of U.S. Department of Agriculture regulations; and

(6) withhold medical treatment from a sick animal in an effort to preserve its organic status. All appropriate medications must be used to restore an animal to health when methods acceptable to organic production fail. Lots of aquatic animals treated with a prohibited substance must be clearly identified by lot number and shall not be sold, labeled, or represented as organically produced. Except for earthen ponds not lined with impervious barriers, facilities containing aquatic animals during medical treatment are not required to undergo conversion periods specified in paragraphs (k), (l) and (m) of § 205.255 Aquaculture facilities.

§ 205.254 Aquaculture living conditions.

(a) Aquaculture systems must establish and maintain living conditions as documented in the Organic System Plan that accommodates the health and natural behavior of the aquatic animals, including:

(3) an environment operated within the tolerance limits characteristic of the aquatic animal and stage of development by monitoring and maintaining water quality appropriate for the production system and species, including temperature, pH, salinity, photoperiod, dissolved oxygen, ammonia, and nitrite concentrations, without sudden changes or prolonged exposure to extremes; and

(4) containment that allows the animals:

(i) to exercise swimming behavior within the culture unit; and

(ii) minimal potential for injury.

(b) The culture system must be managed to minimize the risk of losses of cultured stock, stress to cultured aquatic animals caused by predators, and harm to predators. Organic aquaculture facilities must develop an integrated Predator Deterrence Plan as described in the Organic System Plan that identifies potential predators, appropriate deterrence methods, how predator behavior will be modified by application of deterrence methods, documentation of control methods and effects, contingencies for failure to achieve objectives, and how plan implementation conserves biodiversity in the ecosystem adjacent to and including the aquaculture facility.

(c) Non-organic aquatic animals may be used in aquaculture production systems for controlling pests, such as weeds, snails, algae, and parasites. Triploid animals may be employed provided that the animals are legal to culture, not labeled organic, and readily separated at harvest from the aquatic animals under organic management.

§ 205.255 Aquaculture facilities.

(a) Construction and operation of organic aquaculture facilities shall not compromise the structure and function of adjoining aquatic and terrestrial ecosystems as described in the Organic System Plan.

(b) Water sources for aquaculture facilities must be selected carefully and managed to avoid environmental contaminants that can harm human health.

(c) Facility boundaries shall be identified clearly.

(d) Organic aquaculture facilities shall provide buffers from potential contamination sources including pesticide drift and other possible contaminants from conventional aquaculture as documented in the Organic System Plan.

(e) Pond berms and tank tops shall be designed and constructed to prevent contamination from the environment during a 100-year flood event.

(f) Potentially adverse environmental impacts from aquaculture production must be minimized. The rate of effluent discharge must not exceed the natural assimilative capacity of an area within 25 meters of the site boundary. For the purpose of this paragraph, the "site" described in the Organic System Plan is an identified area of land or a water body owned by the facility operator or licensed or leased by government authorities or other parties for the aquaculture facility.

(g) Every organic aquaculture facility must develop a Nutrient Management Plan that evaluates the technical and economic feasibility of options appropriate for the culture system to recover solid and dissolved waste nutrients in other plant and animal crops. Options may include using settled solids as a soil amendment, suspended solids to grow filter-feeding aquatic animals, and dissolved nutrients as a nutrient source for terrestrial crops, aquatic plants, or crops grown hydroponically.

(h) Construction and operation of aquaculture facilities shall not impair water quality to require a change in the designated use of receiving waters and must not salinize or otherwise contaminate soils.

(i) Aquaculture facilities must be managed with all reasonable security measures (mechanical, physical, and biological barriers) with the goal of eliminating escapes caused by predators, adverse weather conditions (including floods), facility malfunction, facility damage, or other causes. Facilities must be operated with preventative measures against possible escapes into the natural environment of the aquatic animals in production. The Organic System Plan must describe measures to prevent escape, procedures to detect and document escapes should they occur, and actions to be undertaken in the event of escape.

(j) Open water net-pens and enclosures are permitted where water depth, current velocities and direction, and other factors act to adequately disperse metabolic products in order to minimize accumulation of discharged solids on the sediments under net pens. However, water currents should not cause fish to expend excessive energy to swim and be unable to consume feed. Monitoring shall be employed to ensure that the natural assimilative capacity at the site and adjoining waters is not exceeded. Facility managers shall take all practical measures to prevent transmission of diseases and parasites between cultured and wild aquatic animals. Use of multiple species of aquatic plants and animals to recycle nutrients must be included in every Organic System Plan for net-

pens. Except as may be provided in § 205.601 or § 205.602, chemical treatment of biofouling organisms on nets is not allowed. Any open water net pen or enclosure site must not have prohibited substances, as listed in § 205.105, applied for at least one year prior to beginning organic management.

(k) Production systems with direct soil-water contact are allowed, provided that a conversion period of one year occurs under organic management before production can be certified organic.

(l) Production systems with containment units of plastic, fiberglass, metal or concrete surfaces are allowed, provided that the unit is filled with water to its capacity and then drained before production can be certified organic.

(m) Recirculating systems are permitted if the system supports the health, growth, and well-being of the species, including:

(1) stocking or biomass density appropriate for the particular species being produced to ensure animal health and overall well-being, including the natural behavioral characteristics of the species; and

(2) the provision of emergency life support systems to provide appropriate maintenance of water quality, especially dissolved oxygen levels, in the event that primary life support systems fail.

§ 205.256 Aquaculture additional [Reserved].

§ 205.257 Molluscan shellfish [Reserved].

§ 205.258 Farmed aquatic plants.

(a) Aquatic plants may be grown in organic systems for human consumption and as feed for aquatic species that utilize algae for food, provided that:

(4) any pond or containment vessel from which algae are intended to be represented as organic must have had no prohibited substances, as listed in § 205.605, applied for one year immediately preceding harvest of the crop;

(5) aquatic plants may be provided dissolved macro-nutrients and micro-nutrients, including trace minerals, chelating compounds, and vitamins listed in § 205.601 and § 205.603; however, the dissolved amounts shall not exceed those necessary for healthy growth of the plants, and such culture media shall be disposed of in a manner that does not adversely impact the environment; and

(6) the pond or containment vessel has berm elevations with distinct defined boundaries and buffer zones with runoff diversions to prevent the unintended application of a prohibited substance into the pond or containment vessel, or allow contact with a prohibited substance applied to adjoining land that is not under organic management.

(c) Manure from terrestrial animals may not be used to fertilize aquatic plants unless composted as provided under § 205.252 Aquaculture feed.

§ 205.259 Harvest, transport, post harvest handling, and slaughter of aquatic animals.

(a) Handling of stock during harvesting, transport, and slaughtering operations must be carried out with minimal disturbance and stress to the aquatic animal.

(b) Adverse environmental impacts associated with harvest operations must be minimized

(c) Aquatic animals transported to slaughter and processing facilities, or to live haul markets, shall be transported under conditions appropriate to the species and in such manner to minimize the adverse effects of:

(6) water quality;

(7) time spent in transport;

(8) animal density;

(9) metabolic substances; and

(10) escape.

(d) Fish should be held in high quality water for the duration of food deprivation prior to transport and slaughter for a period that allows clearance of stomach and intestine contents.

(e) Just prior to slaughter and before or immediately after they are removed from water, finfish must be stunned by a method that renders them instantly insentient and maintains insentience until death.

(1) Permitted procedures include:

(i) concussion to the head promptly followed by prompt severing of the gill arches or decapitation;

(ii) electrical stunning immediately followed by severing of the gill arches or decapitation;

(iii) electrocution with electric current sufficient to achieve insentience; or

(iv) ice slurry for warmwater marine finfish; provided that this method will be only permitted for five years after the date when organic standards for farmed aquatic animals are promulgated as an amendment to the Final Rule.

(2) Prohibited slaughtering methods for finfish include those that use:

(i) ice or ice slurry except as provided in (iv) above;

(ii) carbon dioxide;

(iii) synthetic anesthetics, including MS-222;

(iv) natural plant anesthetics, including clove oil, not approved by the U.S. Food and Drug Administration for this purpose;

(v) suffocation or asphyxiation (leaving fish to die in air); or

(vi) exsanguination (bleeding) without stunning.

(f) Slaughter using ice or ice slurry is allowed for crustaceans, molluscs, and other aquatic animals that are non-sentient.

(g) The disposal of harvest water, blood water, viscera and disinfectant should pose no threat to wild or farmed fish or the environment and comply with existing laws.