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Wild Fish Conservancy

N O R T H W E S T

S C I E N C E E D U C A T I O N A D V O C A C Y

June 15, 2007

Washington State Department of Ecology
Northwest Regional Office
3190 - 160th Avenue S.E.
Bellevue, WA 98008-5452
Attention: Tricia Miller

Re: Draft Renewal NPDES Permits, American Gold Seafoods Marine Net Pens

<u>Facility</u>	<u>Permit Number</u>
Clam Bay—Saltwater I	WA-003152-6
Fort Ward—Saltwater II	WA-003153-4
Orchard Rocks—Saltwater IV	WA-003154-2
Site 1—Deepwater Bay	WA-003156-9
Site 2—Deepwater Bay	WA-003157-7
Site 3—Deepwater Bay	WA-003158-5
Site 4—Skagit Bay, Hope Island	WA-003159-3
Port Angeles—Ediz Hook	WA-004089-4

Dear Ms. Miller:

Wild Fish Conservancy appreciates the opportunity to respond to the May 2007 invitation from the Washington Department of Ecology soliciting public comments regarding the draft NPDES permits referenced above. We especially appreciate the extension in the comment period to June 15, 2007 (email message from Lori LeVander, Ecology, to Thomas Buehrens, Wild Fish Conservancy, June 4, 2007). Enclosed for the record and your consideration are Wild Fish Conservancy's comments on the draft permits, based on our review, personal communication with Ecology employees, and consultation with other scientists and professionals.

Wild Fish Conservancy represents approximately 2000 members in the region. Many use and enjoy estuarine, nearshore, and marine areas throughout Puget Sound for recreational, scientific, aesthetic, and commercial purposes, deriving benefits from robust wild-fish populations and healthy aquatic habitats. Many Wild Fish Conservancy members take an active role in the conservation and recovery of Puget Sound and its wild-fish populations. Wild Fish Conservancy conducts recovery related research on wild-fish populations and habitats, advocates for scientifically and legally responsible wildlife and habitat management, and develops cutting edge habitat-conservation initiatives. Public and tribal agencies, scientific institutions, the business community, the environmental community, and the news media have all recognized Wild Fish

Conservancy's credibility regarding wild-fish ecology and its specific experience in issues associated with the conservation and recovery of Puget Sound.

I. Introduction

Commercial salmon farming in marine net pens is not widespread in Puget Sound as compared to other parts of the world. Regardless, Wild Fish Conservancy does not believe that farming Atlantic salmon in open system marine net pens represent a sustainable use of public resources, nor are they consistent with the Governor's goal of restoring Puget Sound by 2020, a goal shared by the Legislature with the recent passage of ESSB 5372, creating the Puget Sound Partnership.

The use of open marine net pens in Atlantic salmon aquaculture is much more prevalent in British Columbia, where they have generated a significant public-policy and scientific debate. The Special Committee on Sustainable Aquaculture of the Legislative Assembly of British Columbia, after extensive examination of the economic, social and environmental issues, recently issued a final report which strongly recommended a rapid transition away from open net pen aquaculture:

Finfish Recommendations. A rapid, phased transition to ocean-based closed containment begin immediately. [sic] Within three years ocean-based closed containment must be developed. Once developed, industry must transition to this technology within the subsequent two years.

Final Report of SPECIAL COMMITTEE ON SUSTAINABLE AQUACULTURE, Legislative Assembly of British Columbia, May 2007, p. 39.¹

When this technology is developed in Canada, closed containment will become a required alternative "AKART" for the American Gold Seafoods NPDES permits. WAC 173-220-130.

Wild Fish Conservancy has concerns that these permits and supporting documentation do not reflect the current state of the law or peer-reviewed scientific literature, nor do they sufficiently protect water quality, marine sediments, or the aquatic biota of Puget Sound. We would have expected these permits to be as stringent as possible given our northern neighbor's experience and very recent recommendations regarding open pen salmon aquaculture, and Washington's own recent commitment and action to restore Puget Sound. We recommend that new permits not be issued until the numerous deficiencies in the supporting documentation and analysis are corrected. The permittee will be able to continue operating under the current permits until these actions are completed. WAC 173-220-180(5). If new permits are issued, we do not think a five year permit term is appropriate and believe that a one-year permit with mandatory and public review of monitoring is more appropriate.

Our detailed comments follow.

II. Incomplete and Unavailable Data and Analyses

¹ <http://www.leg.bc.ca/CMT/38thparl/session-3/aquaculture/reports/Rpt-AQUACULTURE-38-3-Volume1-2007-MAY-16.pdf> Accessed June 14, 2007.

Ecology supports the issuance of these renewed permits with a short “Fact Sheet.” The references cited in this document are not current, with the most recent cited publication being six years old. The analysis is likewise extremely outdated, and relies largely on the nine year old decision in *Marine Environmental Consortium v. Ecology*, PCHB No. 96-257. During the past six years much additional research has been published to shed new light on the ecological impacts from the use of open marine net pens for Atlantic salmon aquaculture.

As with the previous two rounds of permits, Ecology relies on monitoring to address potential problems with the net pens. However, it is difficult for the public to review and comment on the new permits when the purportedly extensive monitoring is not readily accessible. For example, the Fact Sheet cites the Atlantic Salmon Watch Program to ensure that escapements do not become a major problem, but the only readily available information on this program in Washington State, managed by the Department of Fish and Wildlife, is five or more years old. Similarly, Ecology’s discussion of the issue in the proposed permit Fact Sheet, three paragraphs under “Evaluation of Tsitika River Data,” is identical to the analysis prepared six years ago for the existing permits. In the course of reviewing these proposed permits, we have easily located a number of substantial new scientific studies and policy reports beyond the state of the art when Ecology prepared the Fact Sheets that remain substantially unchanged for these permits. Without any analysis of either the permittee’s prior years’ monitoring reports, or any consideration of the current state of the science with respect to net pens and their impacts, it is impossible for us to prepare a complete and cogent review of Ecology’s proposed action.

In Washington, requisite monitoring reports are generated and sent to Ecology and the Department of Fish and Wildlife. Some of those reports can be found on agency web sites, but even when they can be located, they often are not adequate for a substantive review of impacts. For instance, the benthic monitoring conducted by the permittees in the previous permit cycle cannot be found on Ecology’s web site. Data on escaped Atlantic salmon can be found on WDFW’s website (www.wdfw.wa.gov/fish/atlantic/comcatch.htm). Regarding data on escapes, it is unclear for the years 2000-2006 whether “none reported” means “no report was submitted,” or “zero.” In any event, that WDFW information contradicts information also sourced to WDFW found at <http://www.aquaticnuisance.org/AtlanticSalmonMay2006.pdf> which indicates that over 25,000 Atlantic salmon have escaped in that period.² The lack of readily available and current data on Atlantic salmon escapes is directly contrary to the intent of the statute creating Washington’s Atlantic Salmon Watch Program. RCW 77.125.030(6).

In British Columbia, there have been complaints that aquaculture companies have not been forthcoming with data and information regarding their operations. Recently, at least one operator, Marine Harvest, has placed information about their environmental policies as well as sea lice monitoring data on their web site (http://www.marineharvestcanada-westcoast.com/m_and_r/sea_lice.htm). The sea lice monitoring effort is conducted in cooperation with conservation groups (http://www.sfu.ca/cstudies/science/CAAR_MH_PR_Jan06.pdf).

Contrast that with the situation in Washington where it appears that neither American Gold Seafoods LLC nor their parent company, Smoki Foods, Inc., has any web site whatsoever, let alone information regarding the environmental policies of the company or the environmental

² “Aquaticnuisance.org” is a project of the Congressionally created inter-state compact entity, Pacific States Marine Fisheries Commission. Washington State is an active member. See <http://www.psmfc.org/commissioners-advisors-coordinators.html> (accessed June 14, 2007).

impacts of and reporting for the facilities. Of greater concern, neither Ecology nor the Washington Department of Fish and Wildlife have made any of the monitoring reports, data, or analysis readily accessible.³

Recent recommendations by the Legislative Assembly of British Columbia include provision for additional agency resources for monitoring, including surprise monitoring by agencies. As their report states, “reporting can no longer rely on industry policing itself.” Final Report, supra, p. 41. We recommend that these permits require that monitoring work plans, raw data, and reports be submitted to and reviewed by a panel of independent scientists as well as Ecology for review and approval. We also request that all such information be made readily available on the internet. As currently written, the permits do not require all reporting to be in both paper and electronic format; this provision should be changed.

We also request that Ecology revisit alternatives analysis for the mitigation of the net pens’ impacts, and for their very existence as open water facilities. The analysis of alternatives is addressed in two ways: 1) technology-based effluent limitations or AKART under the CWA, and 2) the requirement under SEPA to “study, develop, and describe appropriate courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.” WAC 173-220-120; RCW 43.21C.030(2)(e). It has been many years since Ecology has reviewed and analyzed (at least publicly) the impacts of these net pens or alternatives to mitigate for risks and impacts. As noted above, the new Fact Sheet—the only substantive environmental impact and mitigation analysis available to us—is largely unchanged from previous rounds of permitting.⁴

III. Antidegradation

The US Environmental Protection Agency (EPA) recently approved Washington’s revisions to the state’s antidegradation policy (May 2, 2007 letter from Michael Gearheard, EPA, to David Peeler, Washington Department of Ecology). Washington had an antidegradation policy in 1997 water quality standards that is similar to the 2003 version. EPA’s approval removes any possible ambiguity as Washington now has in place an antidegradation policy that meets current federal requirements. This antidegradation policy (Chapter 173-201A WAC, Part III) should be followed in Ecology’s evaluation of these draft permits, not WAC 173-201A-070, which is no longer effective.

1. Tier I

Protection of existing uses and the water quality necessary to support those uses is accomplished through Tier I of antidegradation. Washington’s 1997 standards (WAC 173-201A-070) required protection of existing uses while the 2003 standards require protection of both existing and designated uses (WAC 173-201A-300(1)). EPA has not yet approved the 2003

³ In 2002, comment was made on these permits requesting that Ecology “ensure public access to all required Permittee records.” Comment by Shaun Cantrell, Friends of the Earth. Ecology did not respond to this specific request and has still not achieved transparency in management of public resources with respect to these net pens. We do appreciate the Northwest Region staff’s response to specific requests this week.

⁴ Ecology’s failure to update and analyze the waste discharge standards applicable to the net pens is also inconsistent with the spirit of the authorizing statute, often used to justify a lowered threshold of review for net pens: “the department shall review and incorporate, to the extent possible, studies conducted by state and federal agencies on waste discharges from marine finfish rearing facilities.” RCW 90.48.220(3).

standard's "Marine water designated uses and criteria" (WAC 173-201A-210). According to the draft Fact Sheets, all of the waters in which the net pens are located are Class AA marine waters. Therefore the "designated uses" for the water bodies in question must consist of the list of "characteristic uses" for "Class AA" marine waters found in WAC172-201A-030(1)(b) of the 1997 standards. Under those standards, The uses include, but are not limited to:

- water supply (domestic, industrial, agricultural).
- stock watering.
- fish and shellfish:
 - salmonid migration, rearing, spawning, and harvesting.
 - other fish migration, rearing, spawning, and harvesting.
 - clam, oyster, and mussel rearing, spawning, and harvesting.
 - crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing, spawning, and harvesting.
- wildlife habitat.
- recreation (primary contact recreation, sport fishing, boating, and aesthetic enjoyment).
- commerce and navigation.

The draft Fact Sheets should outline the impacts the facilities have on each of these characteristic uses (and any others that Ecology's evaluation reveals). The permit should be conditioned if necessary so that existing and designated uses (and the requisite water quality) is attained. The draft Fact Sheets fail to contain any analysis of the impact on uses. Detailed descriptions of how net pens can impair designated and existing uses and the water quality needed to support those uses are listed below in the appropriate sections.

2. Tier II

Tier II of antidegradation protects the water quality of "high quality" waters. Even if EPA had not approved Washington's revisions, some kind of Tier II analysis is needed. The antidegradation policy in the 1997 version of the standards (WAC 173-201A-070) required that any degradation of high quality waters be in the public interest and that degradation could not be so severe as to impair existing beneficial uses. The draft Fact Sheets describe antidegradation, but do not describe any specific Tier II review that has been done for these permits. Regardless, the applicable Tier II regulations are found at WAC 173-201A-320, not at WAC 173-201A-070(4).

Ecology has published guidance ("Supplemental Guidance") on Tier II antidegradation that has come into effect upon EPA's approval (Ecology 2005):

This guidance is to be implemented for any eligible actions (described below) that commence after the date the revised antidegradation regulations have been approved as meeting Clean Water Act requirements by the USEPA. Actions with plans or specifications approved by Ecology before EPA approves the new regulations are not subject to the new Tier II review process.

Clearly, the current "plans or specifications" of these facilities (the proposed NPDES permits) were not approved by Ecology "before EPA approve[d] the new regulations." Ecology should evaluate these permits using the new regulations and guidance.

a. The proposed permits are “new” actions.

The regulation (WAC 173-201A-320(1)) limits a Tier II analysis to a “new or expanded action.” While the facilities or their discharges are certainly not “new” as defined in the dictionary, they are “new” facilities in this context. Because the draft Fact Sheets do not describe the substance of Tier II reviews, it is unlikely that any meaningful Tier II antidegradation reviews were ever conducted.

b. Even if not “new” actions, the proposed permits are for “expanded” actions.

If Ecology does not consider these to be “new” actions, then all or most of them are certainly “expanded” actions. The “maximum pounds of feed used per month” is summarized in the table below for both the 2002 permits and the proposed permits (information taken from Fact Sheets for the 2002 permits and the draft Fact Sheets):

Maximum Pounds Fish Food Used Per Month

Facility	Permit Number	Current	Proposed
Clam Bay—Saltwater I	WA-003152-6	450,000	640,000
Fort Ward—Saltwater II	WA-003153-4	450,000	540,000
Orchard Rocks—Saltwater IV	WA-003154-2	470,000	640,000
Site 1—Deepwater Bay	WA-003156-9	250,000	310,000
Site 2—Deepwater Bay	WA-003157-7	250,000	320,000
Site 3—Deepwater Bay	WA-003158-5	350,000	460,000
Site 4—Skagit Bay, Hope Island	WA-003159-3	200,000	320,000
Port Angeles—Ediz Hook	WA-004089-4	650,000	600,000

The permittee is planning on increasing the amount of food used in seven of eight facilities, as much as 60%. These are clearly expanded actions under the applicable regulation (WAC 173-201A-320(2)).

c. “Measurable change”

The regulation (WAC 173-201A-320(1)) limits Tier II reviews to those new or expanded facilities that will cause a “measurable change” to water quality, outside any allowed mixing zone. Page 14 of the draft Fact Sheet says that no mixing zone is authorized by these permits. The draft Fact Sheet does not address Tier II antidegradation; therefore no analysis of whether water quality will undergo a “measurable change” is presented. The most that is said about any parameter is that Ecology does not expect the criterion will be violated, which is much less rigorous than the thresholds spelled out in WAC 173-201A-320(3)(a) through (f).

And there is nothing spelled out in either regulation or guidance on where and how to determine how a marine water project will be analyzed for “measurable change.” For example, the Deepwater Bay – Site 1 is a net pen 352 feet x 190 feet. It is at least 15 feet between the bottom of the pen and the sea floor, in a minimum of 55 feet of water. Because no mixing zone is allocated, it is reasonable to determine if a “measurable change” would occur anywhere in the water column directly adjacent to the net pen (the “sediment impact zone” does not extend into the water column). Given the fact that the facility will feed 290,000 to 310,000 pounds of food a

month, we think it reasonable to assume that a “measurable change” in more than one water quality parameter will occur.

d. The “necessary and overriding public interest” determination

Ecology’s Tier II regulation (WAC 173-201A-320, based on the federal regulation found at 40 CFR 131.12(a)(2)) states that degradation “may not be allowed unless the department determines that the lowering of water quality is necessary and in the overriding public interest.” This is a two-prong test. The regulation (WAC 173-201A-320(4)) also states that “Information to conduct the analysis must be provided by the applicant seeking the authorization...” We have examined the permit applications and the information is not present.

The analysis also requires that Ecology determine if the water quality degradation is “necessary.” The regulation (WAC 173-201A-320(4)(b)) states that the information that must be supplied by the applicant includes:

Information that identifies and selects the best combination of site, structural, and managerial approaches that can be feasibly implemented to prevent or minimize the lowering of water quality. This information will be used by the department to determine if the lowering of water quality is necessary.

The regulation goes on to list a number of examples of alternatives including pollution prevention methods and application of water conservation methods. The applications themselves are bare-bones documents outlining the operations of these facilities. As we noted above, many years have passed since Ecology has reviewed and analyzed the impacts of these net pens or alternatives to mitigate for risks and impacts. The draft Fact Sheet is substantially unchanged from previous versions.

The Supplementary Guidance (Ecology 2005) also states that the application should include:

A statement of the benefits and costs of the social, economic, and environmental effects associated with the lowering of water quality. This information will be used by the department to determine if the lowering of water quality is in the overriding public interest...

The applications are lacking in any relevant information regarding any of the social, economic, or environmental effects associated with their lowering of water quality. We suggest holding public hearings to assist Ecology and the applicant to determine the true “social, economic or environmental effects” associated with open marine net pens.

3. Public participation

We note that the Supplementary Guidance (Ecology 2005) outlines that the public should be able to evaluate the alternatives that are supposed to be presented. Because Ecology’s public notice of these permits did not mention a Tier II antidegradation review, the Tier II review that we are requesting here will need to contain an appropriate public participation component. We recommend that public hearings be held so that information regarding both Tier I and Tier II can be more easily collected.

4. Summary—Antidegradation

EPA's recent approval of Washington's new antidegradation policy means that the new regulations apply to these actions. Ecology has not presented evidence of a Tier I or a Tier II antidegradation review. There is no question that a Tier I review must be conducted. Regarding Tier II, we believe that all of these actions are "new" actions in the sense that they have never undergone a meaningful Tier II analysis. Even if they are not "new" actions, a cursory review indicates that seven of the eight permits are "expanded" actions as the applicant proposes to substantially increase the amount of fish food—and presumably fish—permitted in waters of the state.

No information is presented in the Fact Sheet regarding "measurable change" but it is likely that the facilities do in fact cause a "measurable change" for one or more water quality parameters. The applicant has not submitted the requisite information for Ecology to conduct a Tier II review.

Wild Fish Conservancy recommends that these permits not be reissued until Ecology conducts the requisite Tier I and Tier II antidegradation reviews. We believe that public hearings should be held as part of the public participation process.

IV. Technical Comments

We are also concerned about the numerous adverse water quality and ecological effects of these net-pens. Our concerns include impacts to marine water quality, marine sediments, impacts to Puget Sound's aquatic life, and on the recreational and other uses by people.

1. Water Quality

NOAA (Waknitz and others 2002), in a literature review/risk analysis, concluded that water quality (as measured in the water column) was at small risk from netpens as Ecology has put into place certain siting criteria with appropriate depths and tidal energy to minimize water column problems. An earlier NOAA assessment (Nash 2001) concluded similarly that there was little risk from low DO in the water column.

However, other researchers have reached different conclusions. Goldberg and others (2001), citing a personal communication with Dr. A. Whiteley of the University of Washington (Professor Emeritus, Zoology), state:

In 1997, four of about twelve salmon netpens in Washington State discharged 93 percent of the amount of "total suspended solids" into Puget Sound as the sewage treatment plant serving the city of Seattle.

Goldberg and others (2001) also cite Hardy (2001) as equating the waste from a "salmon farm" of 200,000 fish to the sewage output of 20,000, 25,000, or 65,000 humans, depending on the parameter, nitrogen, phosphorus, or fecal matter, respectively.

Regarding the subject permits, Ecology states that none of the American Gold Seafoods LLC net pens are located in "nutrient sensitive" waters--although the rating of Puget Sound waters cited in the draft Fact Sheet is over twenty years old. We believe that Ecology should use

more up-to-date information regarding Puget Sound's sensitivity to nutrients before concluding that the net pens are not in sensitive areas. For example, Ecology (2002) reports low (< 5 mg/L) dissolved oxygen in Skagit Bay for four consecutive months. While not definitive, this evidence of a stressed ecosystem should trigger greater scrutiny by Ecology of a large nutrient source such as an open net pen. At the very least, information such as this should cause Ecology to require monitoring over and above that outlined in the draft permit (dissolved oxygen measured in the water column at the surface and one-half the depth of the netpen, only once over the course of the permit life).

We recommend that Ecology review more recent information regarding nutrient loading in the areas where these net pens are located. In areas such as Skagit Bay, where some indicators of eutrophication are present, Ecology should require monitoring once each summer month of every year of the permit. For areas that are not deemed to be high risk, dissolved oxygen monitoring should occur once in one summer month every year of the permit. We also believe that additional depths should be monitored, rather than simply at the surface and one-half the depth. As stated above, the allocation of a "sediment impact zone" does not allow for violations of water quality criteria in the overlying water.

2. Chemicals

Farmed Atlantic salmon (*Salmo salar*) are particularly susceptible to infectious hematopoietic necrosis virus (IHN virus) (Saksida 2003) and other diseases. The permit contains language allowing the use of two antibiotics and disease control chemicals. We are concerned that issues such as antibiotic resistance, endocrine disruption and bioaccumulation are not adequately considered in these permits.

At first thought, resistance might be discounted considering the dilution factor. And certainly even if there were ecosystem effects, the risk to human health would be even smaller. Angulo (1999) in a review of relevant literature cited Kerry and others (1994) who isolated oxytetracycline resistant bacteria from the intestines of fish (both natural and commercial) captured on fish farms while fish from control areas did not contain resistant bacteria. Angulo (1999) also cites Ervik and others (1994) who found resistant bacteria in sediments near net pens. In this review of thirty-three papers, Angulo (1999) concludes that:

these data demonstrate that use of antimicrobial agents in aquaculture has selected for antimicrobial resistance among bacteria in the exposed ecosystems. This resistance can disseminate through the environment and can be transmitted to a variety of bacterial species, including bacteria that can infect humans.

While Angulo (1999) was criticized by an industry group for a faulty analysis of some of the literature (NAA 1999), the NAA analysis suffers from problems of its own.⁵ Regardless, it concludes "considerably more information must be available before informed decisions can be made." That is exactly the problem here. No original information is presented nor is there an analysis of the current literature, nor is there any requirement to gather any additional information. Unless there is specific information regarding these particular facilities to the

⁵ NAA (1999) states that Angulo (1999) misstates the results of Ervik and others (1994). However, the Ervik and others (1994) paper is itself mis-cited in the NAA critique. Time constraints did not allow Wild Fish Conservancy to examine the original paper(s). We will be happy to share with Ecology any additional information we collect on these papers in particular and this subject in general.

contrary, Ecology should investigate or direct the applicant to investigate the possibility of antibiotic resistance.

We note that the draft permit does not permit the use of “SLICE” (emamectin benzoate), a chemical used to control sea lice. We have anecdotal information that a sea lice outbreak has occurred at one of the Washington net pen facilities, and we are concerned about the unpermitted application of SLICE for treatment of the outbreak. There are few data concerning the non-target effects of this neurotoxin. Below, we recommend that these facilities (or Ecology) commence monitoring for sea lice. If in fact monitoring reveals sufficient sea lice to warrant treatment, we believe that these NPDES permits will need to be re-opened if emamectin benzoate use is proposed.

Regarding endocrine disruption, EPA (USEPA 2005) states “a variety of chemicals have been found to disrupt the endocrine systems of animals in laboratory studies, and compelling evidence shows that endocrine systems of certain fish and wildlife have been affected by chemical contaminants, resulting in developmental and reproductive problems.” Suspected endocrine disrupting chemicals (EDCs) include dioxins and furans, pharmaceuticals and other chemicals associated with “personal-care products,” some metals (e.g., cadmium, LeGuevel and others 2000; Vetillard and Bailhache 2005; some pesticides (including some herbicides); and some industrial chemicals, USGS 1998; Kolpin and others 2002; King County 2005). Guillette and Edwards (2005) report that nitrate may act as an endocrine disruptor. Ecology does not consider the possibility that the combination of disease control chemicals, anti-fouling chemicals applied to nets, and contaminants in fish feed may adversely affect aquatic life.

We are also concerned about these facilities as a source of contaminants and possible bioaccumulation of the contaminants near these facilities. Hellou and others (2004) detected organic contaminants under and near salmon aquaculture pens. Other recent research indicates that benthic fish near net pens can concentrate trace contaminants originating from fish feed. DeBruyn and others (2006) found that demersal carnivorous rockfish (*Sebastes caurinus*) and quillback rockfish (*S. maliger*) in British Columbia taken from areas under the influence of open net pen salmon aquaculture facilities have significantly higher tissue concentrations of mercury than fish taken from control sites. Rockfish and quillback rockfish are long-lived and have high site fidelity. Modeling indicated that fallowing (no farmed salmon at a facility for a period of time in order to let the area recover) is unlikely to reduce mercury concentrations in these fish, due to the persistence of methylmercury in sediments and in the local food web.

We note that a petition to list copper rockfish and quillback rockfish under the ESA as well as to designate critical habitat has recently been submitted to NOAA (http://www.nwr.noaa.gov/Other-Marine-Species/upload/PS_Rockfish_Petition.pdf), so we are very concerned that these open net pens have the potential to be long-acting sources of contaminants to rare species such as copper rockfish and quillback rockfish. As the draft permits are silent on the effects of open net pens on demersal fish that inhabit the areas around net pens, Ecology must consider additional monitoring requirements to determine the effects of net pens on demersal fish outside the 100 foot SIZ.

3. Marine Sediment Quality

Much concern has been expressed for the effects of fish waste, uneaten food, and contaminant accumulation in sediments. Nash (2001) describes the “bio-impact” of fish feces and uneaten food to be the greatest risk from net pens. The author describes three major impacts to sediments from open net pens: 1) changes to sediment chemistry (e.g., redox potential), 2) exceedance of the aerobic assimilative capacity and increased organic waste loading which lead to changes in benthic fauna, and 3) accumulation of toxic metals in sediments. Regarding toxic metals, Nash (2001) did not consider mercury accumulation such as that described by DeBruyn and others (2006) (described above).

The proposed permits contain language taken from WAC 173-204-412(4), allowing a sediment impact zone of 100 feet extending from the edges of the net pen. Ecology can, however, grant a larger sediment impact zone for these permits based on WAC 173-204-412(4)(a), which states that

the department *may* authorize an individual marine finfish rearing facility sediment impact zone for any sediments beyond a distance of one hundred feet from the facility perimeter via National Pollutant Discharge Elimination System permits or administrative actions (emphasis added).

The regulation goes on to outline the monitoring requirements which are also in the draft permits (summarized in Appendix D of the draft permits).

By the language in the proposed permits, however, it appears that Ecology has already decided to grant a *de facto* infinite sediment impact zone because the language in the permit relating to the scheduling of the “exceedance monitoring” and “enhanced monitoring” of 2007-2009 is simply repeated in 2010-2012. This is unacceptable. Exceedances of the 100 foot SIZ should be treated as a permit violation as well as triggering additional monitoring. If the 100 foot SIZ is exceeded in 2007-2009, the permittee should be instructed to immediately cease operations and submit a plan for reduced operations that would not result in an exceedance of the SIZ, or immediately cease operations and submit a request for a larger SIZ (WAC 173-2040412(4)(a)).

4. Sea Lice

One ecological effect that is not addressed in the current or the proposed permits is the exposure of wild salmonid smolts to the parasitic sea louse (*Lepeophtheirus salmonis*).

Krkosek et al (2006) point out that the natural migration patterns of wild salmonids in the Pacific Northwest result in a segregation of juvenile fish from adult fish in nearshore marine waters. Normally, juveniles have low exposure to parasites, such as sea lice, found on adults. However, when net pens are present, juvenile fish are sympatric with large numbers of adult fish and their associated parasites.

Research in British Columbia has revealed locally elevated parasitism rates in wild juvenile pink and chum salmon migrating past commercial salmon farms (Morton and others 2004; Morton and others 2005). Temperature or salinity differences could not, in contrast, explain the variability of the infestation found in wild smolts from various areas, although no net-pens were located in areas with salinities less than 21 parts per thousand. It appears that the

viability of sea lice is limited at salinities less than 12 parts per thousand (Pike and Wadsworth 1999 as cited by Brooks 2003).

Research by Krkosek et al. (2006) indicates that smolts' exposure to large numbers of sea lice, such as those found in adults of net pens, results in model estimates of 9 to 95% lethality to the pink salmon (*Oncorhynchus gorbuscha*) and chum salmon (*O. keta*) smolts whose migration routes are proximate to net-pens. These aquaculture facilities, by allowing temporal integration of juveniles and adults, thus undermine the natural mechanisms that defend smolts from parasites. Even low numbers of sea lice per farm salmon will adversely impact wild salmon if the farms hold large numbers of fish and/or are sited consecutively along wild juvenile salmon migration routes.

The sea lice issue has been controversial in British Columbia, which has many more net pens than does Washington. Part of the reason for the controversy is the fact that monitoring data gathered by producers is not always shared. We believe that some monitoring to gather basic information should be conducted in Washington and that the information should be public.

Although currently there are no standard protocols for monitoring sea lice parasitism rates in wild juvenile salmon of Puget Sound, Wild Fish Conservancy strongly recommends the development and implementation of such a protocol, and modification of the draft permits to require monitoring for sea lice⁶. These data when combined with surveys of parasitism rates of farmed salmon⁷ would provide evidence as to whether Puget Sound net pens are a source of sea lice. Data gathered would also allow for regulatory response if net pens were found to posing an undue risk to Puget Sound's wild salmon.

5. Marine Mammals And Other Wildlife

NOAA personnel stated (Moore and Weiting 1999) that common methods to prevent losses to the aquaculture industry from marine mammals include "more effective predator nets, and effective acoustic deterrent devices" along with "eliminating rogue animals" and "relocating or reducing populations of predators within the vicinity of aquaculture operations." Because Ecology has a responsibility to ensure that "wildlife habitat," a protected use under Washington's water quality standards, is protected, the draft Fact Sheet should have a discussion of the effect of the facilities on marine mammals and other aquatic-dependent wildlife (e.g., shorebirds, bald eagles). Additionally the Fact Sheet needs to address the methods and extent of predator control, and to discuss how predator control impact marine mammals and other ESA listed species.

6. Recreation

Recreational uses are not considered by Ecology in the draft Fact Sheet. It is immaterial that such factors may be considered by the Department of Natural Resources when granting a

⁶ Such monitoring could involve non-lethal sampling of parasitism rates in wild juvenile salmon including identification to species, enumeration, sexing, and life-stage identification of any parasitoids found. Monitoring would ideally occur at sites proximal to Puget Sound net pens as well as reference sites with comparable environmental characteristics (i.e. salinity and temperature) away from net pens. Additionally, sample sizes of juvenile salmon would need to be sufficient to make valid statistical comparisons between sites.

⁷ One aquaculture producer in British Columbia, Marine Harvest Canada, Inc., has recently entered into an agreement with conservation groups and First Nations concerned about aquaculture's effects on wild salmon (Orr 2007; www.marineharvestcanada-westcoast.com). Marine Harvest samples each active farm site every two weeks. One pen is monitored regularly while two other pens are sampled randomly. Twenty fish per pen are examined and lice are counted and identified as to sex and life stage.

lease for aquatic lands. Recreational uses, including primary contact recreation, sport fishing, boating, and aesthetic enjoyment, are designated uses for Class AA marine waters and thus must be considered by Ecology before permit issuance. The permit applications, while giving the dimensions of the net pen rearing areas, does not give dimensions for the anchoring lines or buoys that are also used. The actual “footprint” of any of these particular facilities, meaning the area no longer accessible to the public, is therefore larger than that represented in the permit application. This is the type of information that Ecology should elicit from the applicant in order to assess the impacts to recreational uses.

We have anecdotal information from citizens observing net pen facilities that they are often illuminated for a majority of the nighttime hours, in order to accelerate feeding and growth of farmed fish (a beneficial (to the operator) by-product might include the attraction of native fish to augment the food supply). Because “aesthetic enjoyment” is a designated use, it could be argued that nighttime illumination of these facilities impairs this use for local residents.

V. Cumulative Effects

Cumulative effects are not considered or even mentioned in the draft Fact Sheet. For example the Fact Sheet represents the fish food used at any facility in terms of “maximum monthly feed” which does not convey the fact that these facilities can be 24 hour-a-day, 7 days a week, 365 days a year operations. The “Site 1—Deepwater Bay” facility (permit number WA-003156-9) has a “maximum monthly feed” amount of 310,000 pounds. An examination of the permit application reveals that there is no month where the estimated use is less than 290,000 pounds of food. This facility is being permitted to use over 3.5 million pounds of food per year. This is especially important considering that many of these facilities are near to each other. Two facilities are in Bellingham Channel, while farther south, two facilities are clustered in Rich Passage. The Fact Sheet does not address these local or regional effects. It is difficult for citizens to meaningfully engage Ecology in this process when these facilities are treated as distinct entities that have no relation to one another.

Similarly, the Fact Sheet does not discuss the net pens in relation to the much larger aquaculture efforts in British Columbia. We may refer to “Puget Sound,” the “Strait of Juan de Fuca,” and the “Strait of Georgia” but in doing so we are simply naming areas of the same waterbody. More frequently, one can find official references to “Georgia Basin-Puget Sound.” Ecology would do well to consider the recent words of the Puget Sound Partnership:

Fisheries management, sewage treatment, toxic pollution, and population growth all impact the Puget Sound and Georgia Basin ecosystem, and these issues have been highlighted at trans-boundary forums. The ecosystem-wide approach is applicable for the work with Canada, **including the integration of scientific data with decision-making**, efficient use of funding, and establishing priorities for longterm ecosystem health (emphasis added) (Puget Sound Partnership 2006).

What is the carrying capacity of open net pen salmon aquaculture facilities in the ecosystem that we share with British Columbia? We believe that the multiple issues associated with salmon aquaculture require a broader examination of the entire issue by Ecology, as well as examining the specific effects of each facility.

VI. Other Regulatory Actions

Since these permits were first issued, a number of species have been listed under the Endangered Species Act; they are at risk of extinction due to the continued decline of the health of Puget Sound and associated fresh waters. These listings include Puget Sound chinook salmon, Hood Canal summer-run chum, Puget Sound steelhead, and southern resident killer whales. The US Army Corps of Engineers issued Section 10 River and Harbors Act permits to allow these facilities to operate. Wild Fish Conservancy plans on petitioning the Corps to reopen Section 7 ESA consultation with NOAA Fisheries to take into account the latest science and the recent listing of killer whales and steelhead.

VII. Summary

We believe that the environmental impacts and risks from open net pens have not been adequately described in past studies and permit conditions. The monitoring described in the draft permits is inadequate and we recommend additional monitoring in order to better describe the risk and impacts. We do not think a five year permit term is appropriate⁸ and believe that a one-year permit with mandatory and public review of monitoring is more appropriate. As the Washington Court of Appeals observed when it dismissed the appeal of the 1996 permits (because the permits had expired by the time the appeal was heard) the limitation on the period of these permits is intended to provide Ecology with the opportunity to consider “changing knowledge, technology, and regulation.”

We request that Ecology not issue the permits with the proposed conditions and the current analysis as reflected in the Fact Sheet. The permits’ supporting analysis needs to be extensively updated to reflect the current state of the science. Ecology needs to conduct an antidegradation review for each permit.

Thank you for considering our views. Please contact me or Mark Hersh of my staff if you have questions.

Sincerely,



Kurt Beardslee
Executive Director

⁸ Ecology is only required to issue permits “not exceeding five years.” WAC 173-220-180(1).

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